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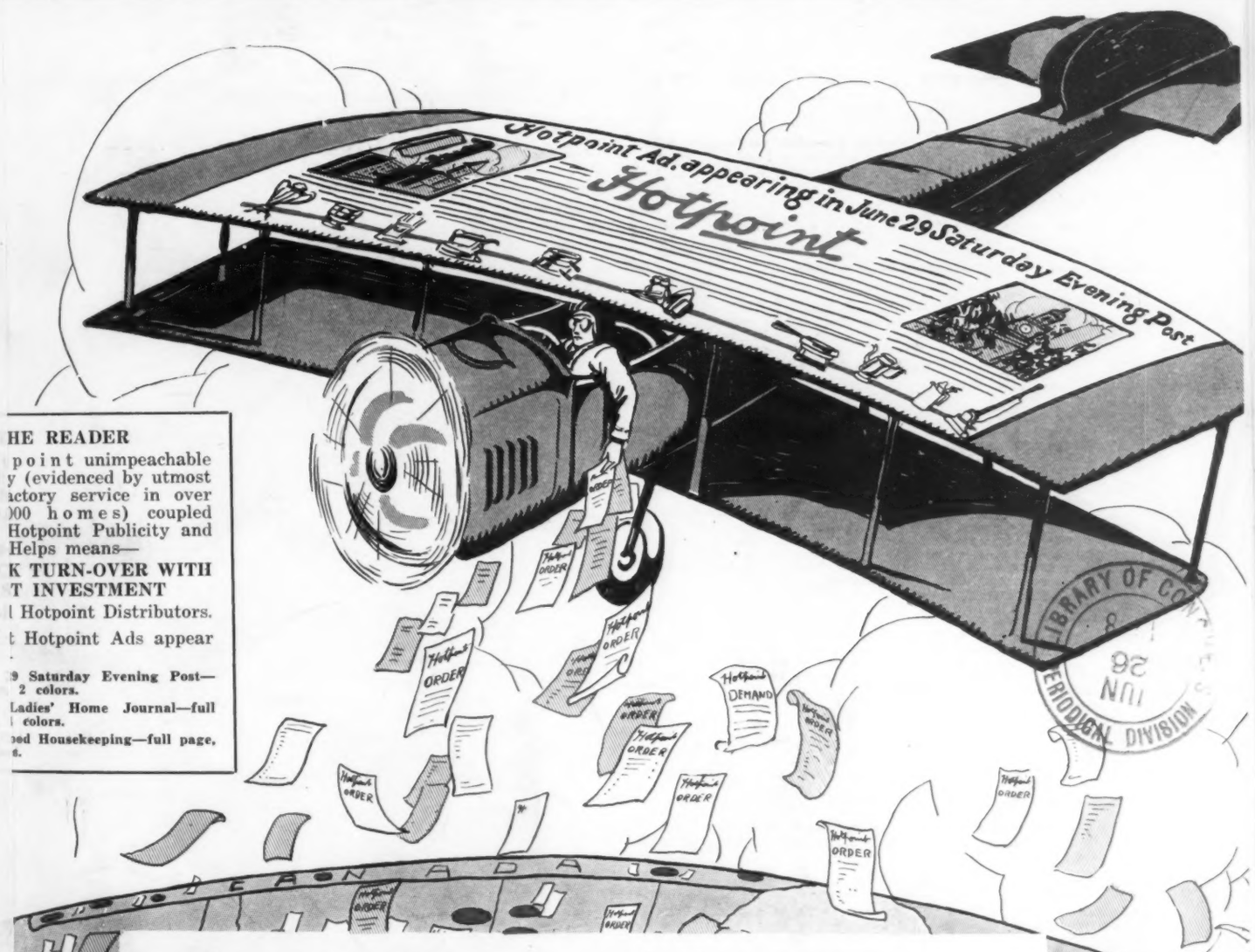
This Issue: Engineering and Commercial Opportunities in China and the Orient

JOURNAL OF ELECTRICITY

VOL. 40 NO. 12 SAN FRANCISCO, JUNE 15, 1918 PER COPY, 25 CENTS



HE READER
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Hotpoint Publicity and
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K TURN-OVER WITH
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9 Saturday Evening Post—
2 colors.
Ladies' Home Journal—full
colors.
ood Housekeeping—full page,
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JUN 28
PERIODICAL DIVISION

—it carries a business-producing message

The Hotpoint Message, in the June 29 Saturday Evening Post — as well as June Ladies' Home Journal and July Good Housekeeping ads — will further popularize the fuel-food-and-labor-saving HOTPOINT ELECTRIC WAY among many million readers.

It will mean increased business for present and prospective Hotpoint Distributors on the Pacific Coast and elsewhere.

This advertising will prove especially effective in increasing the use of Hotpoint lamp-socket appliances to help fill in the load valley caused by the operation of the Daylight-Saving Law.

The above mentioned Hotpoint Ads. will feature, among other appliances, Hotpoint Iron, Toaster, Grill, Stove, Ovenette, Vacuum Cleaner, Valveless Percolators and Boudoir Set.

See that you are supplied with ample stocks—also that you avail yourself of our extensive co-operative Sales-Helps which make it easy to sell Hotpoints.

HOTPOINT DIVISION
EDISON ELECTRIC APPLIANCE CO., INC.
Ontario, Calif. Chicago New York

Patronize Pacific Coast Industry — Our large Ontario, California, Plant can take care of your requirements promptly.

Maximum Amperes 1200 **Maximum Volts 15,000**

Type D-12 Oil Switch or Circuit Breaker

Frame

Extra strong, heavily ribbed; carries operating mechanism and insulating bushings; also serves as support and cover for oil tanks; readily adaptable to any required mounting.

Mechanism

Insures easy closure of switch yet affords ample pressure at all contact surfaces. Provides for very rapid acceleration of movable contact members during the initial opening of the circuit. Easily adjustable to meet any condition of installation.

Brushes

Built up of special hard-drawn copper laminations and are self-aligning. Each lamina makes a positive and individual contact with the stationary contact surface leaving a definite space between adjacent laminae for free circulation of oil. Contact is long-wiping, self-cleaning.

Studs

Made of amply heavy copper rod, thoroughly insulated by high-grade, wet-process porcelain. The lower ends carry the stationary contacts.

Arcing Tips

Each brush is protected by two auxiliary arcing tips which are made of relatively heavy, special-shaped, hard-drawn copper, and are so mounted as to make contact with a similar stationary contact member. Each of these arcing tips is easily renewable and reversible, giving approximately twice the usual length of service, thus decreasing maintenance cost correspondingly.

Terminals

Terminals up to and including 800 amperes are enclosed in insulating sleeves preventing accidental contact with live parts. Switches and circuit breakers in excess of 800 amperes are provided with laminated terminals to which cable terminals or flat copper connections may be bolted.

Oil Tanks

Individual for each pole, made of heavy steel with welded seams. Easily removable for inspection. Reinforced against distortion by heavy "shorts." Oil line or tank exterior shows correct oil height.

Insulation

High-grade wet-process porcelain insulates each stud. Over-load trip coils are wound on porcelain thus thoroughly insulating same from face plate.

Face Plates

Made in two forms: Type "U" for service up to and including 800 amperes; type "U-1" for 1000 amperes or over. Automatic face plates may be provided with any combination of undervoltage, or shunt-trip attachments. Operators cannot hold the circuit breaker closed during an overload or short-circuit.

For complete description get Bulletin No. 418.

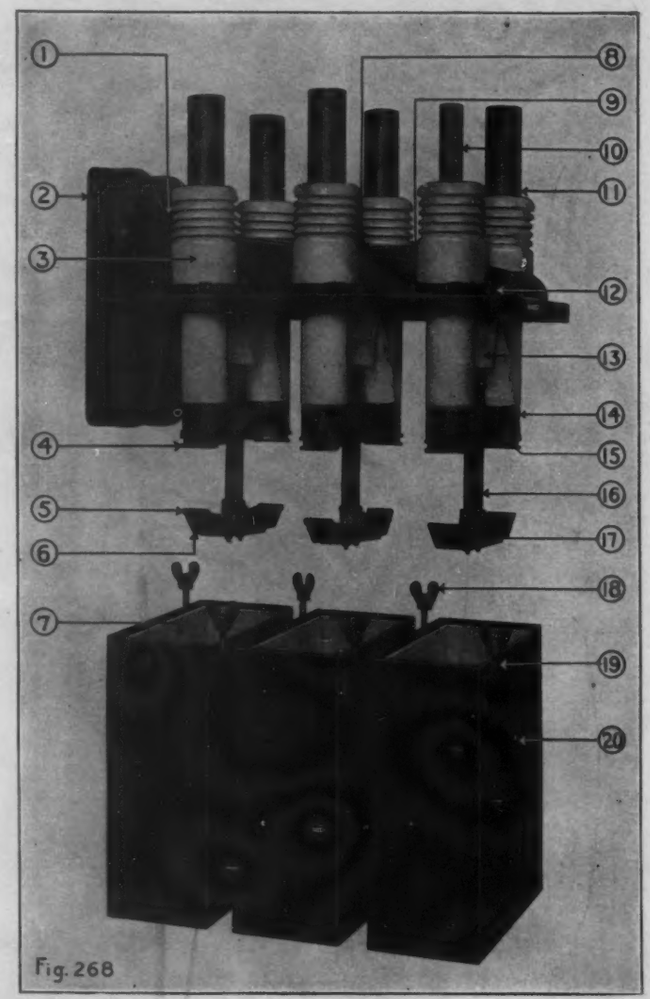

Fig. 268

Condit Electrical Mfg. Company, South Boston, Mass.

Manufacturers of Electrical Protective Devices

Akron, Ohio, 323 Ohio Bldg.
Albany, N. Y., 124 Hudson Ave.
Birmingham, Ala., Brown-Marx Bldg.
Buffalo, N. Y., 604 Electric Bldg.
Charlotte, N. C., Commercial Bank Bldg.
Chicago, Ill., 19 So. Wells St.
Cincinnati, Ohio, 1309-10 Union Trust Bldg.
Cleveland, Ohio, 1202 Illuminating Bldg.
Dallas, Texas, 409 So. Ervay St.
Denver, Colo., 1621 Seventeenth St.
Detroit, Mich., 617 Ford Bldg.
Kansas City, Mo., Interstate Bldg.
Los Angeles, Cal., San Fernando Bldg.
Miami, Fla., 329 Thirteenth St.
Minneapolis, Minn., 716 McKnight Bldg.
New Orleans, La., 818 Hennen Bldg.
New York City, N. Y., 39 Cortlandt St.
Philadelphia, Pa., 929 Chestnut St.
Pittsburgh, Pa., 706 May Bldg.
Salt Lake City, Utah, 216 Judge Bldg.
San Francisco, Cal., 583 Howard St.
Seattle, Wash., 552 First Ave. South
St. Louis, Mo., La Salle Bldg.
Washington, D. C., Conduit Road and Elliott St., N. W.

Northern Electric Company LIMITED

Vancouver Toronto Calgary Ottawa Regina Halifax Winnipeg Montreal London

CONDIT: the Synonym of Safety in Electrical Protective Equipment

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor — CLOTILDE GRUNSKY, Associate

VOLUME 40 — SAN FRANCISCO, JUNE 15, 1918 — NUMBER 12

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TERMS OF SUBSCRIPTION: United States, Cuba and Mexico $2.50 per year; Dominion of Canada $3.50 per year; elsewhere $5.00 per year; Single Copies, current month 25c each.

PUBLISHED SEMI-MONTHLY BY THE

TECHNICAL PUBLISHING COMPANY

CROSSLEY BLDG., SAN FRANCISCO

Eastern Representatives: GRANT ARMOR, Room 2205, 165 Broadway, New York; CHAS. H. VAN KIRK, 123 West Madison St., Chicago

EDWARD B. STRONG, PRESIDENT
WILLIS M. DEMING, V. P. AND GENERAL MANAGER
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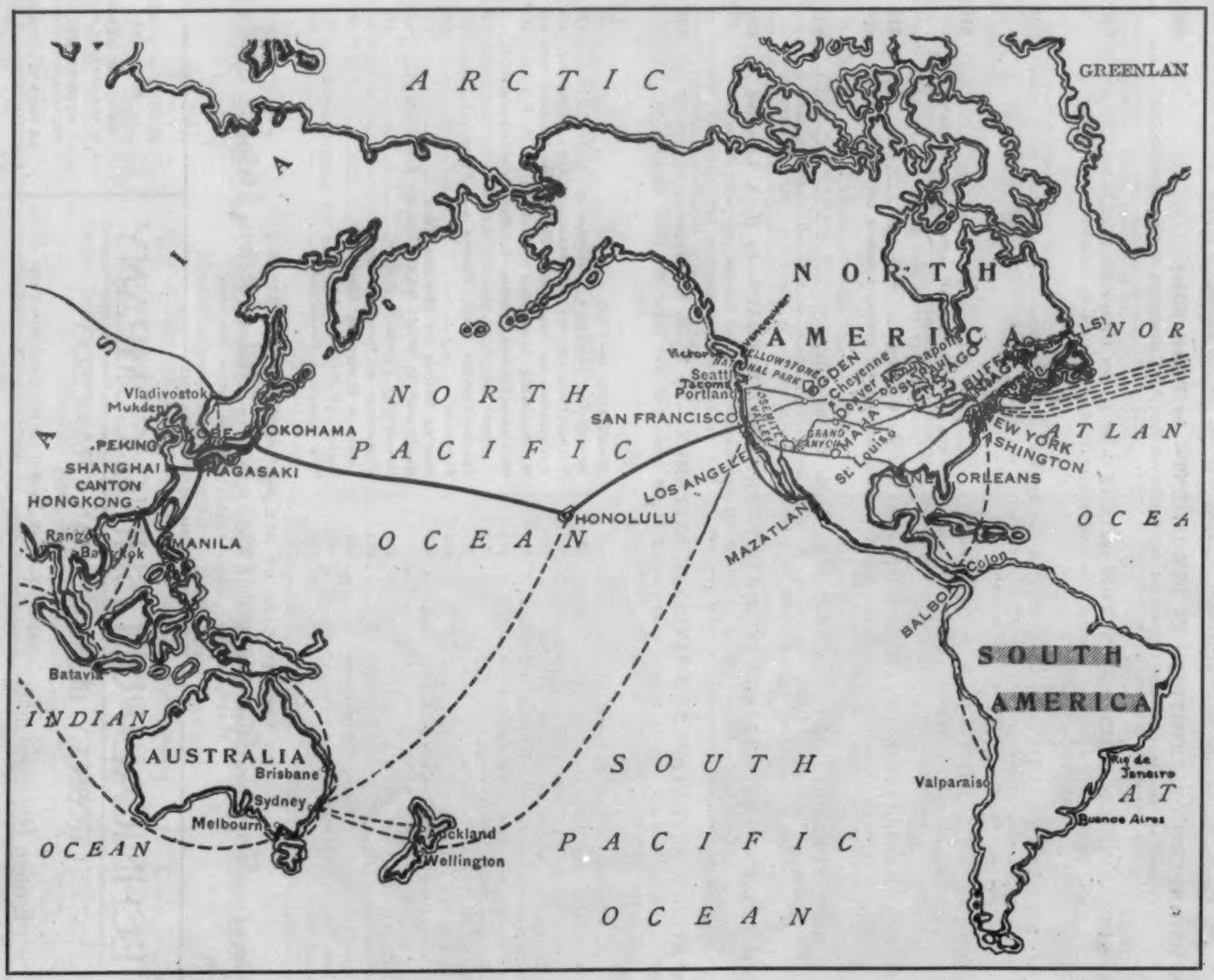

How the Upbuilding of the West is Helping to Win the War

XIII

CO-OPERATION, now the watchword of the hour among men of the electrical industry throughout the nation, is fast passing into an international sphere of activity. Vast opportunities for growth in commerce and engineering exist in the countries that line the great Pacific which may indeed be termed the last new West. A new spirit of internationalism is growing up among the citizens of these nations — a spirit of mutual helpfulness that means a growth in wealth and position without precedent and yet the greatest safeguard against future war that could possibly be devised.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 40 SAN FRANCISCO, JUNE 15, 1918 Number 12

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SOME TEN COUNTRIES WHOSE SHORES are washed by the waters of the Pacific are now among the twenty-three great allied nations of the world, shoulder to shoulder, in the cause of humanity. Did it ever occur to you that it is possible to raise the ethics of industry in all countries of the world to such high standards and then so to live these ideals in daily life, as to make future wars impossible?

The Ethics of Industry

As this issue of the Journal of Electricity goes out not only to a very intensive group of readers in the Western states of America but with especial emphasis to chambers of commerce and engineering houses that line the countries bordering the vast Pacific, it is especially timely and appropriate to call attention to the new ethics in the electrical industry of America that have found their inception in the Pacific Coast States of America and have now entrenched themselves firmly in the hearts of earnest men throughout this nation. By analogy these new ideals may help to solve some of the present perplexing world problems.

To properly supply the consumer with electric ware and with the electrical energy wherewith to operate the vast electrical applications that have of recent years come into use in America it has been found that the electrical industry divides itself into four great divisions of effort. These great divisions represent in all an invested capital of two to three billions of dollars.

First come the manufacturers who design and construct the electrical apparatus and supplies, then the jobbers who take the manufactured product and wholesale it to the retailers known as contractor-dealers. This last division of the industry of course sell directly to the consumer. On the other hand there are the companies who generate electricity both by steam and water power known in America as central stations. These powerful institutions are themselves purchasers of manufactured products for use in their own power systems and often to encourage the further use of electrical energy in the home and in the office they have entered the merchandising business.

So it is evident that the various fields of activity of these four divisions have not in the past been clearly defined. In some instances the manufacturer has sold direct not only to the central station or to the contractor-dealer, thus eliminating the jobber, but in exceptional cases to the consumer. The jobber and the central station on the other hand have sold directly to the consumer and thus eliminated the contractor-dealer. There are many reasons that have justified this practice, although the lack of proper accounting methods and definite figures on the cost of doing business have left its justification often in a more or less hazy relationship.

This overlapping practice has been the source of much confusion and loss of unified collective effort in the past. Recent months have, however, evolved in the West a system of co-operative helpfulness that bids well to so cement the various branches of the electrical industry into one vast harmonious unit that it is believed the splendid good features of this work will not only justify its complete adoption throughout America, but that its helpful activities will rapidly spread to neighboring countries.

In brief, what is known as the California Electrical Cooperative Campaign recognizes the necessity of four great divisions in the electrical industry. Its ethics do not, however, forbid one class from entering the field of activity undertaken by the other, but they do insist that when such practice is thought advisable, then in so far as a particular group must enter the other branch, he must conform to all the rules and practices or in other words to the ethics prevailing in that particular branch.

To specifically illustrate: should the central stations find it to their best interests to continue the practice of selling electric irons and other appliances they may do so, but they must follow in such instances the ethics of good practice in vogue among contractor-dealers.

In the April 1st issue of the Journal of Electricity, were recounted the splendid results of the work in Southern California. Elsewhere in this issue may be found an account of a banquet meeting of over four hundred earnest men representing every conceivable branch of the electrical industry in Northern California. At this meeting men who are national figures in the electrical industry took a prominent

part and expressed the greatest confidence in the outcome of the new ideals evolved under this new departure in practice.

The whole affair means a gigantic stride forward for the good of the industry and it is hoped that as this account is read throughout the nation and in the neighboring countries that border the Pacific it will be a first message in planting the seed for future mutual helpfulness in engineering and commercial relations not only within our own nation but between these great and growing countries of a common destiny.

The Influence of Woman's Thought at Conventions

Those who attended the recent sessions of electrical men at Del Monte and closely followed the helpful results obtained are unanimous in the statement that the women's war service session participated in by wives of members present and by women in the employment of central station effort in the West was one of the most remarkable and helpful achievements of the convention.

It is rather surprising, in view of the tremendous new activities of women, and their splendid service in assisting utility helpfulness to the nation both in private and public service at the office and in the home that more emphasis was not laid upon this feature at the recent Atlantic City convention of the National Electric Light Association.

War Savings Day on June 28

The National War Savings authorities have decided to put over the War Savings proposition June 28th, which date has been officially designated by the Government of the United States for that purpose. It is vital to the success of this movement, that as much publicity be given to the announcing of this date as is possible.

One of the great good features of the present terrible world conflict is the bringing home of the necessity of careful saving even in small bits. The little thrift stamps are fast becoming welcome guests in millions of households in America. They are thrice welcome: They teach us to save; they provide a store of funds for emergencies that may arise in the future; and above all, in the aggregate they make possible a gigantic storehouse of funds for the nation in order that it may meet the mighty drain now upon its convertible resources.

Let June 28 be to all of us a War Savings day for new resolutions and for a practical demonstration of our allegiance to the great cause we have so energetically undertaken.

Trade Conditions in the Pacific Coast States

General manufacturing and jobbing houses of the Pacific Coast report business active and the demand for merchandise of all kinds is good.

Shipbuilding, now a very important industry, continues to grow, some plants being enlarged and new ones started. The first cement ship having filled requirements by undergoing a most satisfactory trip under adverse weather conditions between San Francisco and Seattle, several new orders have been placed because of the abundance of material and the fact that they can be quickly built with less skilled labor than any other type.

In practically all the Pacific Coast cities the wholesale and jobbing trade and all branches of manufacturing and industry are extremely active. Throughout the West the country conditions are excellent except in shortage of labor. The crop conditions are generally good although rain and irrigation water is short in part of the grain growing districts. In and about Spokane the agricultural conditions are excellent.

Taken as a whole there is much for encouragement throughout the Pacific Coast region in all branches of commercial, industrial and agricultural activity. This statement is borne out in the healthy support given to all the recent demands for Liberty Loans, Red Cross activities and other governmental requests which have received splendid oversubscription in practically all sections of the West.

A New World's Record in the Pan-Pacific

The one great factor that is at work binding in closer unity the great countries that border the Pacific Ocean is the shortening of time necessary to transmit intelligence from one end of this vast area to the other. In consideration of this fact a brief review of the new world's records in radio service recently developed between the Far West and the Far East is timely and interesting.

At the outbreak of war, the United States Navy took over the entire radio service of the country. On account of duplication twenty-eight commercial stations were closed. All those in existence were brought together in a comprehensive system, and other stations erected. The new stations at Pearl Harbor, Hawaii, and Cavite, Philippine Islands, the most powerful stations in existence, have been completed, as well as the high-power station at San Diego, Cal. The Atlantic Coast stations are in direct communication with Pearl Harbor, and, with this one relay, a message can be flashed from Sayville, Long Island, to the Philippines. By January, 1918, direct communication had been established with Rome. The United States radio system stretches from Alaska in the north to the Panama Canal Zone in the south. In addition to this service, the Navy furnishes radio-operators for the rapidly increasing number of ships. To meet these needs thousands of wireless operators have been enlisted and trained. At present ther are 5,000 at the two principal schools alone, those at Harvard and Mare Island, Cal.

This new and fascinating innovation in the Pan-Pacific means much for forwarding the future harmonious development of the vast area served. But best of all it means the promotion of a closer and more helpful understanding between peoples of widely different traits, customs, religion and everyday walks of life which, in the last analysis, means an effective stroke in forwarding the permanent peace of the world.

Catalogues for Pan-Pacific Use

Considerable doubt seems to be in the minds of manufacturers and supply houses that are anxious to become known in the markets of the Pan-Pacific area, as to where to send catalogues and other data for proper display.

In this connection it is interesting to note that a number of the larger cities of the countries that border the Pacific are taking means to provide general reading rooms where information of this sort may be sent and a display made of it so that local merchants and others interested may find it of ready access.

Quite recently, for instance, Peru has established a commercial information bureau. The Minister of Fomento, believing that a great many small industries in Peru, especially mining and agricultural, are handicapped by not being in direct communication with either the markets from which they purchase their machinery and supplies or those in which they must sell their output, and also because of the lack of adequate facilities whereby the owners of these resources can inform themselves as to the probable market for the article to be produced, has decided to establish in Lima a Bureau of Commercial Information, the purpose of which will be to gather information that will be useful to the small industries of Peru. An invitation is sent to all manufacturers to send their catalogues and other data and assurances are made that they will receive kindly attention.

Again, here is an interesting notification that was published in Chinese recently in the leading newspaper in Mukden:

"We hear that the American consulate at Mukden has received catalogues from various well-known manufacturing firms in America. In consequence of this a commercial exhibit room has been established in the consulate which Chinese and foreign merchants are permitted to visit. A number of catalogues have been sent to the chamber of commerce. Should any merchants be unable to understand the details specified in the catalogues, an explanation of such details will be furnished by the American consulate. The consulate will be glad to obtain catalogues of any line of goods for which there is no catalogue on hand. (The European war has rendered it difficult to obtain cargo from Europe, therefore why should not the merchants call and examine these catalogues?)"

This particular office arranges facilities for those who do not understand English, so that the Chinese merchants have no difficulty in making practical use of whatever publications are sent.

The splendid facilities that are being arranged for the reception of manufacturers' data and catalogues in many of the great cities of the Pan-Pacific area bespeak kindly attention on the part of foreign departments of American manufacturing houses.

The Electrical Industry in Japan

Engineering in all its various phases in Japan is becoming well handled by Japanese talent due to the earnest and persistent study and research of many of their more ambitious students in foreign universities, technical schools, and manufacturing centers. Local seats of technical learning are also turning out well equipped engineers to care in the future for the nation's industries and manufactories.

The ceaseless activity of her people, combined with an ever absorbing or driving ambition to surpass, will undoubtedly continue to bring about in the near future additional new creations in the industrial arts and in inventions. That the Japanese schools and colleges are today highly efficient and almost completely officered by native talent, driving home native ideals, is indeed a good sign for such individuality in development.

The graduates of her technical schools rank well with those of her citizens who have been educated abroad. The coalescing or combining of the product of these two systems of education as a means for forwarding commercial supremacy is the factor which will in the struggle of human existence call forth creative or inventive gneius in the near future.

The increasing importance of electrical engineering and construction in Japan is best set forth by the fact that a surprisingly large percentage of our total foreign electrical exports go directly to Japan.

Most of our American firms find that the best way to form mutually helpful alliances with men of the electrical industry in Japan is to form in Japan firms allied with the home corporation and in which the home corporation owns a thoroughly representative interest in the stock.

There is a new era in co-operative helpfulness that has been ushered in within all the allied countries. This effort is perhaps nowhere else in the world so far advanced as in the electrical industry west of the Rocky Mountains, where manufacturer, jobber, central station man and contractor-dealer are working together in an almost ideal relationship. This makes possible for a future spreading of these ideals to all countries bordering the Pacific. While the civilizations of the Far East are older than ours by thousands of years yet these men are unusually eager to absorb all the new ideas of helpfulness that America has put forth in recent years. Here is a chance for men of the electrical industry to carry ideals of mutual helpfulness to foreign shores and thus offer real constructive means for establishing the permanent peace of the world.

THE NEW JOURNAL SERVICE: The one big problem that is before the West in its service to the nation is how to finance and develop much needed new power developments. The issue of the Journal of Electricity for July 1, 1918, will feature this problem and set forth just where some of the great undeveloped water powers of the West are located, discuss their relative value and tell how the problem of development should be attacked. The issue for July 15, 1918 will tell of some of the remarkable advances in electro-chemical development that have taken place in recent months in the West. In order to meet the pressing demands incident to the great expansion in usefulness that the Journal of Electricity has undergone during recent months, it has been found necessary to add to its power equipment the latest design of Intertype electrically operated type-setting machine at a cost of several thousand dollars. In this machine not only is the mechanism electrically operated throughout but electricity displaces gas for the heating of the metal used in the casting of the type slugs. Friends of the Journal of Electricity are invited to see this splendid new application of the method electrical now installed in the composition rooms of the company.

AN ENGINEER'S OBSERVATIONS IN THE ORIENT

BY ROBERT SIBLEY

(Many American engineers have during recent months fully realized the new horizon of engineering activity in the Orient both in its broadened acitvity for aiding in winning the war and the new possibilities of usefulness upon the inauguration of world peace. Here is an account of some of the personal impressions gathered by the Editor of the Journal of Electricity when upon a recent tour of the Orient in search of statistics and information concerning future commercial and engineering possibilities of that vast region.—The Editor.)

TRANSPORTATION STUDY
An American engineer obtaining first hand information on Oriental transportation methods

THE present international war and the recasting of world thought into a greatly enlarged scope of activity make possible new ideals of service for American engineering endeavor along the shores of the Pacific and its islands in proportions hard to realize unless one has been an eye witness to these opportunities in the great undeveloped countries of this vast area.

South America and China, the one of manless land and the other of landless man, thus presenting opposite phases of populous development, are especially interesting to the engineer and those handling supplies and industries allied to his field of work.

THE GREAT WALL OF CHINA

This is the engineering feat of all history—the Great Wall of China—stretching from the ocean on the east to the Himalaya mountains on the west, a distance of sixteen hundred miles.

The onslaught occasioned by the present international war both upon men and commerce is now being so heavily felt among the lands bordering on the Pacific and its islands that constructive effort hitherto handled by European enterprise has of necessity passed into other hands. Out from a single American Pacific Coast port passed an eighth of a billion dollars in commerce to ports of the Orient during 1917. The new world now upon us makes it imperative that America awaken to its new resposibilities in commerce now that the great emergency fleet is so soon to make its effect felt in the commerce of the world.

HONG KONG BUSINESS DISTRICT
Hong Kong, the great shipping center of the Far East, has modern business structures in addition to a highly developed native business district.

The question first arises as to how American engineering activity may best establish itself abroad. This must in large measure be a question of growth beginning with meager but well placed confidence upon which to build a great and lasting superstructure. To win confidence in engineering ability, the business ethics of our country abroad must be respected.

The foreign commercial policy of our own government must of necessity be an important factor

in shaping the future destiny of America's share in this great work. The broadest posible national policy must be put into force, for the world, emerging from the great crisis of international war, will demand a truer, broader spirit of humanitarianism than ever before known to international life.

If as a country America is to gain prestige only the highest business ethics must prevail. The disgust occasioned by a certain American implement company unloading some years back huge quantities of ante-diluvian farm machinery upon the up-to-date farming of Argentine is current talk even in the far-off Orient. America can never hope to acquire the prestige desired unless such policies be done away with.

TRANSPORTATION IN MANCHURIA
Camels are a favorite means of transportation in Northern China.

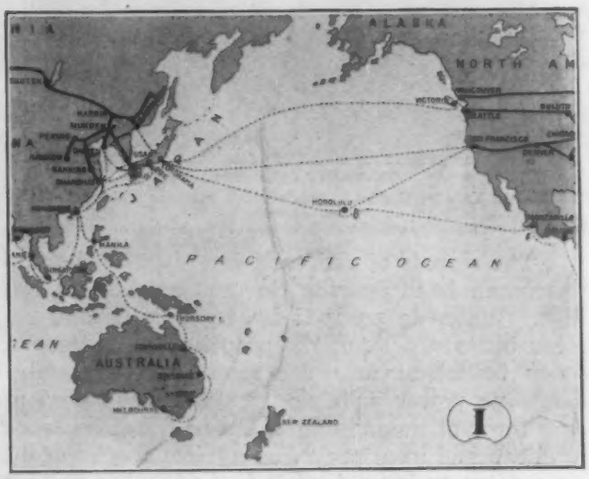
Then, again, our merchants must study packing conditions in order to ensure the sane and wholesome arrival of implements, machinery and supplies in the foreign port. At Manila and in Hong Kong even in comparatively recent years it not infrequently happened that American made apparatus and shipments presented a rather conglomerated and dilapidated appearance under the strain and stress of climate and labor in the tropics. Such disasters never happen wtih shipments from countries used to the exigencies of the tropics.

It is hard for a machinery dealer, experienced in years of handling of shipments for American home consumption, to realize that when he attempts foreign shipments — especially those destined for the tropics — he must "unlearn," as it were, many of the cardinal points of the shipping art he has so laboriously acquired and pursue methods wholly at variance with his former practice. The traveler gets his first inkling in such necessities when he attempts to use his camera in Hong Kong, for instance, and finds that the heavy humid tropical atmosphere has spoiled all his films. One of our largest American film companies illustrates an instance of how one must be alert and wide awake to such new conditions for in Hong Kong all films are sold in carefully sealed cans, thus meeting the difficulty. And so it is that labor conditions, customs of the people, atmospheric differences and a hundred other unheard-of factors in America, materially affect the safe arrival and efficient use of American made goods shipped to foreign ports.

The engineer too may well profit by these words, for after the preliminary investigation is made and development decided upon, his duties are largely connected with problems of construction. And when it comes to problems of construction in the Orient, the engineer becomes at once an importer in the highest sense of the word.

After all is said and done the personal character of those reaching the trade has perhaps more permanent influence than anything else in getting results. Formerly, those representing American business houses in the Orient were largely composed of adventurers. Today, however, it is interesting to see the alert, wide-awake group of young men employed to exploit for instance the British-American Tobacco Company and the Standard Oil Company's interests through China. In a word, the old slogan

PUBLIC CONVEYANCE IN KOBE, JAPAN
The jin-rikisha, a mode of conveyance quite popular throughout Japan and many of the Far Eastern sea ports.



THE LAST NEW WEST
The great Pacific Ocean and the countries washed by its waters which constitute the final interlinking of the old with the new and offer opportunities of mutual helpfulness probably to an extent never before presented in the history of the world.

> "Who misses or who wins the prize
> Go—lose or conquer as you can
> But if you fail or if you rise
> Be each, pray God — a man"

applies equally forcefully among the ignorant but philosophical Chinese as among the most cultured and self-respecting classes in America.

Engineering construction and operation is largely accomplished by human effort in the Orient. Thus the residence portion of the city of Hong Kong, built upon a precipitous hill-side slope to get the refreshing monsoons or ocean breezes,

is a wonder for solid stone and heavy construction. Chinese women packed upon their backs practically all the materials used in its erection.

Men haul immense wagon loads of traffic in such instances where the burdens are too great to pack them upon their backs. Such portions of the city streets which are to be watered are covered by hand water carts operated by a native.

ON THE YANGTSE KIANG

The famous Yangtse Gorges, through which pass the waters of an empire more populous than any other district in the world—gorges that are capable of stupendous hydroelectric power development.

The signals of railroads are given by hand and watchmen hand operate closures at railroad crossings. Water is pumped by tread mills and small river boats are similarly propelled. Pottery and other industrial arts are manufactured solely by hand—no power driving mechanisms being used save those of human effort. In fact, human labor is so cheap and local prejudice against mechanical devices often so keen, that it is doubtful if our labor saving devices could really be applied in many instances in the Orient.

By far the most spectacular display of the futility of modern invention to overcome the local prejudice is to be seen in the coaling of the great ocean going liners at Nagasaki. Here thousands of tons of coal are loaded upon the steamers by women and girls. The coal is first brought in floats or barges to the sides of the vessel. Ladders are then erected to engage port holes of the vessel and the women and girls line up as formerly did the town fire brigade in passing water hand by hand to put out a fire. After having formed several of these lines, the coal is placed in baskets and these are passed hand over hand until it reaches the upper port where the coal is dumped and the baskets returned.

It is a pitiful though intensely interesting sight to watch the progress of coaling. The women, many of them with little babies strapped to their backs work cheerfuly through the long hours of the day

COALING A TRANSPORTATION LINER

The view of mothers with babies strapped to their backs and little girls filling baskets with coal, all assisting in the coaling of great ocean-going steamers, is a picture that long dwells in one's memory. The baskets are adroitly passed hand over hand to the ship's bunkers above and the complete coaling thus effected in a day's time.

working for a daily wage of fifteen cents, so I am informed.

Some of the cabin passengers amused themselves by tossing pennies down upon the barges and watching the resulting confusion in the fight for the coins. Some wit aboard conceived the idea of running down into the chief engineer's room and secretly "borrowin'" a handful of iron washers. These with great furor were tossed enmasse upon the barge. Thinking a tropical rain of money was taking place, the entire coaling crew dived in to gather the favors. After the mob tumbling and tussling had subsided and the joke was discovered, the simple folk on the rafts below enjoyed the joke

A VIEW FROM THE WALL OF CANTON, CHINA

Outskirts of Canton, the great metropolis of southern China, through whose narrow streets passes the commerce of an empire.

fully as much as did the passengers aboard. Needless to say, they did not suffer in coins to follow for the amusement furnished. One day is usually sufficient to accomplish in this manner the complete coaling of any ocean going vessel putting into Nagasaki for its supply of fuel. It is remarkable what gigantic results may be accomplished by such primitive methods oftentimes wholly without the aid of any modern labor saving devices.

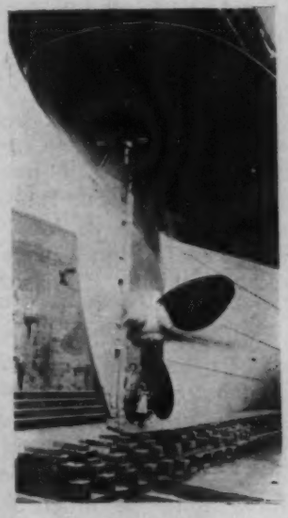
On all sides one may note, nevertheless, the gradual but triumphant advance of modern methods

in construction. Indeed the thought processes of western civilization are rapidly being reflected in the garb wherewith the native attires himself. In the new commercial era so soon to sweep the Orient, especially in China, undoubtedly the old will give

THE SACRED BRIDGE, NIKKO, JAPAN

The ancient structures of Japan have a native grace and bearing, wholly unique. Yet, at the same time, in the symmetrical proportions the engineer easily discerns that although the designer was evidently not posted in mathematical laws of flexure and breaking stresses of beams, still it is evident that unconsciously the human mind has expressed them in actual accomplishment.

place to the new in an ever increasing geometric ratio.



THE DRYDOCK

The Chinese employed in the drydocks make excellent mechanics. They are industrious, use their wits, and at times are ingenious. They must, however, be strictly watched by an overseer who knows good work, and they know that he knows it.

As our ship went on dry dock at Hong Kong, the cordial invitation of the Captain to dine with him aboard ship the afternoon of her going off the dry dock was acepted. There was abundant time in which to inspect the workmanship of the construction in the dry-dock itself and the skilled labor put upon the ship.

The dry-dock is of permanent construction as is shown in the illustration. Careful inspection is the most necessary feature of successful mechanic work in the East. The native is alert, able to think and use his head, but he seems to possess the yearning to be extremely neglectful and careless in his work if he knows he will not be zealously watched and inspected.

In Japan one is given abundant opportunity to observe ancient and modern construction side by side. And especially is one enabled to observe the decided influence of engineering ideals of western civilization as opposed to former methods.

The most gigantic illustration of former engineering effort that came under my observation was the huge statue of Buddha at Kamakura, about eighteen miles out of Yokohama. This immense statue is cast in bronze in five sections, as may be observed in the illustration herewith displayed. A

THE GREAT ARCHED BRIDGE AT TOKYO

In the far East on all sides one sees evidences of the crowding out of the old and the setting up of the new. This is especially true in engineering design and accomplishment, and receives its greatest emphasis in the constructive effort of the Japanese.

comparative size is shown to the eye by the fact that the writer of this article, who is shown on the arms of the statue, is over six feet high. Indeed the statue is so colossal that one may climb up into the head of the effigy and there worship Buddha at a shrine which is perpetually maintained for savants of the religion.

THE GREAT DIABUTSU

The great statue of Buddha, near Yokohama, Japan.—What another civilization has accomplished without the means and assistance of modern engineering thought and genius.

The arched bridge herein displayed illustrates the former methods employed in Japanese design. This particular structure is the "Sacred Bridge" at Nikko. It is the one over which General Grant was told that he might pass, although no foreigner had ever before been allowed the privilege. Tradition has it that upon reflection he said that if no other foreigner had ever been allowed the privilege, he too would refrain.

To show the contrast of modern structure with these former ideals and designs, there is also shown in illustration the well proportioned stone arched bridge of Tokyo.

In conclusion, it is seen that the trend of Western civilization has forcefully made itself felt in Oriental life and beyond the question of a doubt Western economic constructive methods have slowly but surely proved more economic even over cheap labor conditions there to be found. As a consequence one may say with assurance that the new era ahead is largely to be one employing labor saving devices in every instance possible. And in this new era the broadened humanitarian ideals of America, devoid of a spirit of domination, but permeated with an overpowering yearning to be of helpful service in recasting the trend of world constructive effort, will prove of ever increasing importance.

BANKING AND ENGINEERING IN THE ORIENT

BY HARRY CHOYNSKI

(In spite of war conditions, trade with the far East has maintained a satisfactory level. With the new prosperity in China and more progressive banking laws from this side, there is no reason why the United States should not take a full share in the new trade era which is developing. The present situation, particularly as regards electrical wares, and the part which the banks must necessarily play in it is here interestingly analyzed. The author is vice-president of the Anglo and London Paris National Bank and thoroughly in touch with the oriental situation.—The Editor.)

Notwithstanding the many difficulties under which it has been carried on during the past few years, trade has been exceptionally satisfactory in Japan and quite good in China. This wave of prosperity is reflected in the banking and financial conditions, as demonstrated by reports, official and otherwise, reaching these shores through varoius channels.

Japan is rapidly swinging into a commanding financial position which will enable her to dictate lending terms to other nations. In construction and engineering projects, therefore, Japan can hardly be considered a fair field for enterprising Americans. Our advantage in that quarter will come rather through their ability to exchange with us a greater volume of products. It is entirely certain that Japan will be a real competitor in the building of new works in China, public and private, which promise a profitable return to the investor.

China is in exceptionally prosperous condition.

Japan in her enterprising way is preparing to capture electrcial trade in China.

Chinese commerce depends upon foreign banks in Treaty Ports.

Under revised laws American banks are establishing foreign branches.

IN CONSEQUENCE

China presents a fine field for American engineering and commercial enterprise.

The world production of raw material being scarcely adequate to present needs, it is not surprising that demand for the commodities which China exports has been so well maintained. The result has been that the native received higher prices for his produce and in consequence has been able to buy more heavily in foreign markets, both of goods and of services. Continued prosperity within the Empire should create conditions wherein new enterprises may be successfully launched with capital derived from natives in co-operation with foreign investors, and under these conditions development should be fairly rapid.

When the war has ended there will undoubtedly be increased commercial and engineering relations between China and the Pacific ports of America. But we must commence immediately to erect a firm foundation to support the structure else competitors will develop advantages difficult to surmount.

That Japan is alive to the future possibilities of China is too well established to require comment here. Already she is seeking to prove her efficiency and her right to China trade. An elaborate electrical exhibition held in Japan in March was a function intended as a preliminary step on the part of Japanese electrical manufacturers to their capture of the China market for their wares. At least this is the impression gleaned both from the announcements and actions of those controlling the affair. The leading business men of China were especially invited with a view to bringing home the development of Japan's electrical industries to China merchants whose vast possibilities as buyers of electrical equipment and apparatus must be thoroughly appreciated by the energetic and progressive Japanese. The press announced the exhibition as planned to advertise the future possibilities of Japanese electrical industries not only to China but to the whole East, and thus assist Japan's electrical purveyors to capture the Far East market for their products. In fact, the various exhibits seem to have been designed in such manner as to impress the visitors with Japanese efficiency in this line.

But the steady stream of Americans journeying to the Orient on business bent will bring back information regarding the constructive requirements of an improved China. Here will be found a fertile field for the employment of capital in needed development work. However, the timidity of capital is proverbial and it is hardly to be expected that our funds will be employed abroad until representative American banks have been established for foreign service, whose campaign of education will not only stimulate interest, but create confidence.

The Japanese banking system, splendidly organized, has developed a number of great banks whose branches beyond the national boundaries encourage foreign trade and investment. Agencies of these institutions operate in the principal ports of China, alongside those British banks—especially created for foreign service—that have done so much to expand and assist British commerce in all parts of the world. French banks of some prominence have also been conducted along similar lines and have entered the China field. Before the war, Germany was represented in the Orient by The Deutsche Asiatic Bank, a powerful institution, whose chief function was to support German international commerce, and participate in loans that had some significance beyond the interest yield.

Unlike other countries, the Chinese commerce depends mainly upon the Foreign Banks concentrated at the Treaty Ports. While these banks, as at present constituted, do not undertake the financing of new works, they would nevertheless represent their own Nationals in superintending investment and collecting dues. With respect to such necessary representation, the United States has been sadly lacking. Whereas American banking regulations

hitherto discouraged the establishment of branches abroad—the National Bank Act actually prohibited it—recent enactments wisely provided for our foreign development and already banks have incorporated for the particular purpose of operating overseas. Thus China, in its new-found prosperity, and America with new ambitions for extending its banking activities to foreign lands by joining forces, can create ideal institutions designed to foster industry and to provide for new construction.

Until the recent embargos become effective, China showed evidence of an increased dependence upon the United States for many commodities previously obtained from Europe. In practically all lines of iron and steel manufactures,—in short, all construction materials—the demand was limited by what we could supply. But this condition was the result of a world war which prevented the usual suppliers from participating in foreign commerce. To insure the continuation of this profitable trade, and to push our lines into a broader and more important field, the opening is imperative for agencies of American banking institutions such as are now forming. This is true of the known necessity of distributing interest bearing securities of some character, in order to provide the credits needed to purchase vast quantities of materials, machinery and equipment, and the nation underwriting the bond issues will undoubtedly sell the supplies. American capital invested in China could insist that all construction materials be purchased in this country, and when the projects were completed, all operating supplies would likewise be sent from here.

Due to the flotation of the various Liberty Loan issues we, as a people, are coming to understand bond investment, so that the task of wide distribution should not be so difficult, and when investment securities of foreign states are brought out under proper auspices, they should meet a favorable reception. This again emphasizes the supreme importance of carrying our banking power into the Orient as an advance agent in our scheme of expansion. And they must be institutions in which our people have the fullest confidence. Fortunately, it can be said at this time that combinations of capital now mobilized will be employed in foreign banking and that worthy projects will find adequate support.

Here, then, exists a fine field for immediate investigation by engineers, because successful participation in the competition which is inevitable after the war, will depend upon a proper understanding of conditions and its effective utilization.

ELECTRICITY SUPPLY FOR CHINA

In discussing the problem of electric supply for China at a recent meeting of the Engineering Society of China, Mr. W. J. Williams, after pointing out the great possibilities that await the future of this country, dwelt upon the necessity of centralizing power plants at places where water and fuel supply conditions were suitable, and the further necessity of standardizing the equipment, voltage, current, etc., so that interlinking of systems could be carried out at future dates. He suggested, also, that China should profit from the mistakes made by other countries in multiplicity of voltages and frequencies met with.

AN INSTANCE OF FOREIGN ENGINEERING GRAFT

Some time before the American occupation of the Philippine Islands a group of architects and inspecting engineers were sent over from Madrid to construct a beautiful stone structure which was to commemorate, in a measure, the love and paternal ardor felt by the home government for its far-off possessions.

Now from Manila to Madrid it is considerably farther than a day's walk. Anyone that has spent days and days making this trip fully recognizes the fact. Evidently this group of "experts" had much time en route in which to ponder over this fact. At

AN ILLUSTRATION OF ENGINEERING GRAFT

Tradition has it that the full moneys were paid to the builders for the completion of this building, and that the money having been secured so easily, those standing in on the deal at the end of the year asked for an appropriation for janitor's service and repairing the roof and that this, too, was forthwith paid.

any rate upon arriving upon the scene of their sacred activity, work was commenced. With the true ardor and dash of the Spanish cavalier the stone foundation work was completed. About this time, however, one can imagine that one of those hot, languid tropical days for which that section of the world is so famed must have arrived. At these times the imagination gently wafts itself free from the body and like the dreamer under the influence of opiates, one sees visions. The inspecting engineers and architectural experts whereupon must have had their yearnings materialized even though in fancy and seen the completed structure in an hallucination. At any rate a report was sent to the home government that the work was completed and the remaining appropriations due for the construction. In due course of time the entire moneys for the completed work arrived. This structure so artistically "completed" is shown by the illustration as it appears today.

But listen, my readers, the story is but half told. The money for the completion of the structure came through so easily that when another year had rolled around, a bill was sent to the home government for janitor service and for repairing the roof. Tradition has it that this too made its prompt appearance in order once again to impress upon the bewildered Filipino the intense devotion held for him by the home government so far away.

POWER PLANT PRACTICE IN THE ORIENT

BY KAY INGERSLEV

(The history of electricity in the Orient is one of romance, of difficulty and opportunity. Conditions as they obtain in the power plants of Siam are more or less typical—and extremely interesting to one not familiar with the East or the Tropics, where the telephone poles and conduits are of teakwood—and the interpreter uses his own judgment in translating to the prospective customer. The author of this entertaining article, formerly electrical engineer with the Siam Electricity Company, has returned to this country.—The Editor.)

TROPICAL GROWTH IN BANGKOK

Siam suffers all the joys of the tropics from the white ant which devours telephone poles and wire insulation to natives who steal the copper wire from transmission lines.

IT IS the intention of this article to give the reader a general idea of the present conditions in electrical development in Siam, and the importance for American industry to prepare the field for the future requirements of the Orient. Siam as a country is little known to the average business man on this continent, although it is one of the richest and most up-to-date countries of the Orient. The capital, Bangkok, with a population of about one million, has two power plants, one run by a private concern and one by the government. The private company, Siam Electricity Co., Ltd., started in business as far back as 1898, and has by far the majority of customers; the government plant was erected about six years ago, and has developed very little since, largely on account of being a government undertaking, which has no shareholders to satisfy with a yearly dividend.

The Siam Electricity Co., Ltd., has a steam plant of about 5000 k.w., consisting of three turbines, 1000 kw. each, two Diesel engines of 200 kw., several old steam engines and two motor generators for the tramways. The original system for light and power was single phase 2300/100 volt, 100 cycles, four wire, neutral, not grounded, but at present only less important branch lines are operated single phase. The tramways are supplied with 500 volt d.c. from the motor generator sets. The fuel used is paddy husk (rice shells), this being obtainable very cheap and as a rule in plentiful quantities all the year round. Recently, on account of exceptional floods in the country, however, which devastated about two-thirds of the rice crop, oil had to be used. This increased, of course, the cost of operation considerably. Adjoining the power station is a workshop, employing about a hundred men. The work done is partly repairs and overhaulings of the company's own materials, including tramcars, and partly motor car repairs and the making and upkeep of all kinds of electrical fittings and machinery.

A considerable business is done in milling machinery, the town having about fifty rice, saw and grain mills.

The distribution of current for light and power comprises by far the most important part of the business. The feeders (about 250 miles) are supported on wooden poles, and consist of ordinary stranded copper wires, maximum area of one feeder wire being 70 sq. miles. The poles are spaced about 35 meters apart, having an average height of 12 meters. The wood used is as a rule teak, this being the only safe kind to use on account of the white ants. It has been found that if a teak pole is properly set, and regularly inspected and treated with creosote solution, it will remain in service from fifteen to twenty years. The method of reinforcing old poles with a collar 50 centimeters high by 10 centimeters thick has been fully tried out, and the conclusion arrived at is, that if the job is properly done, that is, all sapwood and rotten parts removed before the concrete is applied, the pole will give service for at least another eight years, and naturally save considerable expense for the company, partly in the outlay of materials and labor, and partly in money lost in current and the inconvenience to customers of being disconnected for several hours. The trouble in the Orient is, however, to get experienced labor, and as competent supervision is expensive the company has lately gone in for concrete posts, and will probably in the course of a few years extend this kind of support to all its lines, as cement is cheap, being a product of the country.

NEW RAILROAD

From Bangkok to Singapore, about 400 miles. Dining cars and sleeping cars and all latest improvements are provided, but traveling by night is largely given up owing to the trains being attacked by elephants who become maddened by the noise and light.

The insulators used are of the ordinary pin type, maximum voltage being only 3500. These are all

manufactured in Japan, and up to the present time very little trouble has been experienced, although they are inferior to the American make. The company posseses a special testing plant for insulators; each lot is subjected to the dry and wet test, by a voltage eight times the working pressure, and during the last three years only about three per cent have broken down under the tests applied.

The transformers used are of the ordinary pole type, the make before the war being entirely German, but lately tenders have been asked for from American manufacturers. The climatic conditions are rather severe in regard to upkeep of transformers, six months dry season being followed by six months rain, and when it rains in Siam it rains.

Naturally the oil has to be inspected three times a year, and changed every autumn when the rains stop. Considerable trouble has been experienced

STRINGING TROLLEY WIRE BY NIGHT

Labor is cheap but unreliable — in consequence concrete poles are largely being substituted for teakwood.

with water condensing on transformers having connecting boards; even the bushings for wire inlets have caused trouble during the dry season, the compound used not being able to stand the sudden changes in temperature from night to day. Some trouble by overheating of transformers was experienced about five years ago, on account of the neutral not being grounded, and the short circuiting of the third harmonic currents through the neutral wire back to the generator,—but as the neutral is now only used for single phase branch lines, this trouble has been eliminated.

The motors installed range all the way from 1/8 to 200 h.p., the smaller capacities being mostly used for printing machinery, small grain and saw mills and pumping, and the larger motors for saw mills and rice mills, cement plants and water works. The pressure used for power is 100 or 175 volt; some 600 and 3500 volt motors are in use and these have given full satisfaction, even during the six months of the rainy season.

The installation of light for customers is undertaken by the central station, which has a staff of about two hundred workmen, employed entirely on

THE MARKET PLACE

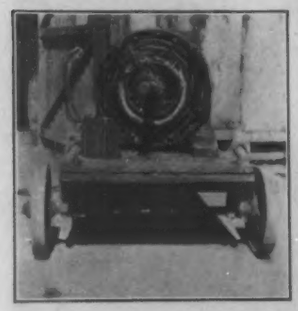
All markets are traversed by canals and in this respect the tram car has not yet come into its own. The Bazaar is coming to represent a considerable lighting load, however, as a large part of the business is carried on at night.

upkeep of lines and house installations. Two systems are used for inside work, one having the wires strung in varnished teakwood casings, and the other using regular conduits of the simplex type. The first is only used for wooden buildings; the latter for stone or concrete structures. The reason why the old-fashioned method of using wooden casing is still in practice is, that nearly every wooden house in town has white ants, and these beasts eat the insulations off the wires, if no regular inspection is made. The wooden casing, which being teakwood, in itself is safe against the ants, affords an easy way to ascertain the condition of the wires, by simply removing the capping for a few meters in the basement of the house to be inspected. The American product "Duraduct" was tried, but as it contains braiding it proved to be a regular joy for the ants, so it had to be abandoned.

Quite a considerable amount of fittings are sold as the Siamese lately have gone in for building regular houses in European style, and the monthly sale from incandescent lamps is from five to seven thousand. The system used for lighting the Bazaar and native quarter is a flat rate system, the light being switched on from 6 p.m. to 6 a.m. This way has become very popular among the small private customers, especially shopkeepers, as the best business in the Bazaar is done during the night hours. The oil lamp has been abandoned on acount of the exorbitant price of oil even in this oil producing country. The tramcars are run from 5 a.m. to 12 midnight, the heaviest load being in the noon hour and from four to six in the afternoon.

The overhead construction is ordinary suspension from wooden poles in the town and catenary suspension in the suburbs, where the cars attain a maximum speed of from thirty to thirty-five miles an hour.

The question of bonding the track is rather a difficult one, as copper bonds are too big a temptation to the natives, if not fastened very securely; even then it is only a question of time before they will disappear. Only last year some of the 3500 volt lines were cut about seven times in one month, and several hundred meters 50 sq. mm. wire removed. The job was done during the night in the outlying district of the town. On account of this and the present high price of copper, the company has thought it advisable to introduce iron wire for suburban feeders, but as definite information regarding iron wire for transmission lines is very difficult to obtain, and as the present shipping conditions to the Orient are in an impossible state, the question has been abandoned for the present.



25 h.p. motor used in the Bangkok plant

Nearly all the goods in Siam today are imported from Japan, the reason being, of course, the shorter time of delivery and cheaper rates compared with the American or European markets.

The electrical goods manufactured in Japan are a cheap imitation of the American goods, but the trouble is that in most cases the local buyer finds it "good enough for the Orient." The writer has had occasion to meet several American commercial travelers in the Orient, and in most cases the man trying to sell American goods has not fully understood what the Japanese competition means. The ordinary comercial man, as a rule, does not speak the native language, and must always be led by an interpreter, and I can assure the reader that the conversation between the interpreter and the native buyer is very often something quite different from what it ought to be.

There is absolutely no limit to what the Orient will require in machinery of all kinds when this war comes to an end, and the time for preparing the field is right now. The Japanese is fully aware of this fact, consequently he is working hard to join his own ends. It is always more difficult to make a customer buy a new type of machinery, than to sell him the kind he already knows.

ELECTRICITY IN CHINA

BY R. A. LUNDQUIST

(China is awake — and in need of light. With the vastness of its possibilities, a new current of prosperity and a genuine "taking to electricity," the field is one which should appeal to American manufacturers. This remarkable article is written especially for the Journal of Electricity by the special agent of the U. S. Department of Commerce who has just returned from investigating electrical possibilities in the Orient.—The Editor.)

China, as a market for electrical goods, has only of late been to any extent recognized by American manufacturers. On the whole that country has apparently been regarded as an unpromising field for anything so modern.

The fact is that this great nation of an ancient civilization is rapidly developing a demand for electrical service, and plants are constantly being constructed in all sections of the country. At present, however, there is no impressive total number of stations in China, there being probably not more than a hundred cities that have electric service. When consideration is given to the vastness of the country and to its population,—somewhere near 325 millions,—it will be evident that the electrical development of the country has only begun.

In view of the small number of plants that have gone in so far, the total trade in electrical goods is as yet not large. In 1916 the imports classified under "Electrical Materials and Fittings" totaled 3,431,571 taels ($2,710,941), while "Propelling Machinery" (as Boilers, Turbines, etc.) amounted to 576,503 ($455,437), and "Telegraph and Telephone Material" to 611,143 ($482,814). The smallness of the trade at the present time, and a tendency on the part of our manufacturers to regard China as it was when they studied it in their school-days, tends to deceive them as to the real possibilities of the field.

With its immense population, a progressive tendency and an increased purchasing power on the part of a very small percentage of the people will mean a large gross number. One per cent of the population aggregates three times the population of New Zealand, or three-fifths that of all Australia. Moreover, such a percentage of the people of China will represent a greater purchasing power than will the general average of the people of Australasia, to continue the comparison.

While China is outwardly and politically poor, as a nation, there are a large number of very wealthy merchants and officials, and as a general thing the people "take to" the use of electricity and of electrical appliances very readily. This is very apparent. As one strolls along a Chinese street at night, in in such cities as have electric service, he is impressed by the numbers of small shops of all descriptions that have electric lighting. Furthermore these shops are well lighted, and it can be said that the foot-candle intensity is greater in the average run of small Chinese shop than in many a store of equal importance in a small American city.

The use of electric power is at present quite limited except at a few treaty ports, and as a matter of fact there are not throughout China many industries at present to which power can be supplied, because so many of them are on such a small scale. Power-using industries, however, are being established gradually.

While China has been regarded as a "cheap market," this is not exactly the true situation. Installations must naturally be cheap to enable many

consumers to use electricity, but on the other hand there is a strong demand for high class goods from others. It has been said that the Chinese desire good quality in large things, but that in minor devices cheap goods will more likely be favored. It will no doubt be advisable for American manufacturers to offer both qualities in order to meet the requirements of the market as broadly as possible. It may be noted here that a Chinese buyer knows quality when he sees it, and personal observation showed that there was a great deal of high-class equipment being used.

The great future of China as an electrical market will come with the development of its natural resources. This will result in a wider use of machinery and in the establishment of proper transportation facilities throughout the country, and with such a development will come an increased earning power on the part of the people. The increased earning power will broaden the present possible use of electricity, in addition to what is directly used in connection with the development of the natural resources of the country.

Summing up the situation, there should be a rapidly growing demand for electrical goods in China in the next few years, and American manufacturers can secure a fair share of this trade. They must, however, be prepared to enter the market now, and must be willing to observe the details that are essential. They must arrange for proper representation, they must offer goods as the Chinese want them, and in some cases they will find it advantageous to be in a position to extend liberal terms to native companies where new developments or large extensions are concerned. Satisfactory shipping conditions must also be arranged for, and that means American ships for American goods in the ultimate analysis.

The Chinese people look upon America as a friend, and American manufacturers have sentiment strongly in their favor. If they accept the opportunities presented and make serious, conscientious continued efforts, they can build up a strong and valuable trade in electrical goods with China.

FOREIGN TRADE AFTER THE WAR

BY JOHN CLAUSEN

(The possibilities before America at the conclusion of the war in the way of international trade are unbounded—but we must learn to take advantage of them. As yet the United States citizen has not learned to invest his money in enterprises abroad, nor have the banks been in a position to give proper support to the trader. The author of this clear-cut exposition is vice-president of the Crocker National Bank of San Francisco and an authority on international trade questions.—The Editor.)

Whether the end of the war is near or far, not the least among the many evils of a prolonged international struggle must be considered the artificial world-wide conditions which such a state of affairs brings about. The usual relationships of commerce have been disrupted and altered to the extent that new means for carrying on any form of international trading have become a daily issue and of constant necessity.

The test, in so far as it has served to rouse American public opinion in international affairs and to an understanding of commercial interdependence of nations, has been of especial benefit to the United States. While there may be too much optimism as regards our opportunities, there will doubtless be a change in our commercial and financial position when the present world-wide strife comes to a close. It may be safe to predict that the volume and direction of our trade will be different. The ability of European nations to furnish capital to develop other countries will, in all probability, be lessened, perhaps for a period of many years to come. South and Central America, China, and Mexico may turn to us more than ever before in the purchase of goods and for their financial needs.

The International Commerce of the United States in the past has not been far different from that of any new country which had great natural resources and was sparsely populated. There was more to be made by developing our own resources and domestic trade than in producing manufactures for export in competition with the cheap labor of older countries. As the time went on and our population grew, we became the greatest consuming nation in the world. Our manufacturing interests rose to more importance until in many lines we lead all rivals, not only in volume of product but in economical production, because of so varied and abundant a supply of raw materials, which made it possible to organize production upon a great scale.

When the war is over we cannot, however, expect to employ all this capacity in simply supplying our home markets. In order to keep these works busy and the wage-earners employed, we must find markets abroad, and there is every reason to believe that other countries will be in great need of all the things with which we are bountifully blessed. But this demand for goods will undoubtedly be accompanied by frequent requests for credit and by appeals for the people of this country to take their pay for these products of our factories in securities, which will virtually represent an interest—either as lenders or proprietors—in foreign enterprises.

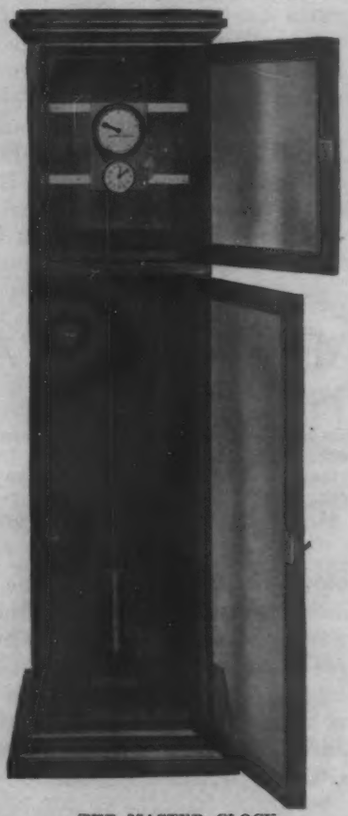
In wealth, our superiority is undeniably great, but it is not yet certain to what extent this wealth will be available to support our international trade and other activities. A similar body, although less numerous, has been developed in Germany, France, Holland and Belgium. The question with us is whether we will know how to use our new position in world affairs, and our new wealth in such manner as to internationally strengthen ourselves and develop such a constituency behind our industry.

THE STANDARDIZATION OF FREQUENCY

BY H. E. WARREN

(Although manufacturing plants have hitherto at one time or another experienced difficulties owing to fluctuation in frequency, the matter of standardization was not one of pressing importance until the present tendency toward interconnection of power systems has made its consideration imperative. The new system, described here, simple enough in itself, promises not only to revolutionize power plant practice in this respect, but to introduce a new load for the central station in the possibilities of clock installation.—The Editor.)

In view of the rapid consolidation of the great power systems of this country, it is a little strange that no particular effort has been made to standardize the frequency. It has been assumed that the ordinary frequency meters found in all power plants are sufficiently correct for practical purposes and discrepancies between the various meters which happen to be connected to the same system have been overlooked. Some one of the meters may have been chosen arbitrarily as a standard for the system.



THE MASTER CLOCK
By keeping the second hands together it is possible to maintain an absolutely even frequency—Fig. 1.

As a matter of fact, practically all of the commercial frequency meters in use are liable to errors of calibration, variations with wave form of the current, changes due to age and use, and other marked variations due to temperature. In consequence it has been found that such frequency meters are quite likely to be as much as 1% or 2% in error either high or low.

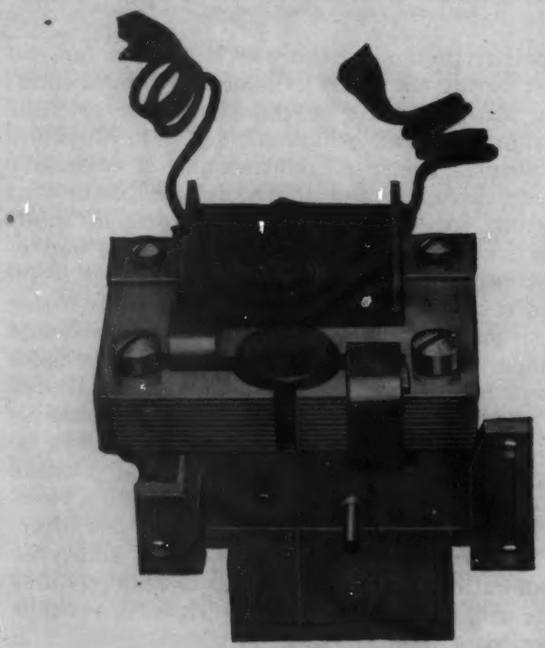
The great importance of accurately standardizing and maintaining the frequency as nearly as possible at its true normal value cannot be too strongly emphasized:—

1st. The efficiency of generators and turbines will vary with any departure from normal frequency. An error in the average value of the frequency of 1% may mean appreciable loss either in capacity of the turbines or at their points in the electrical system. Even the transformers are affected by variations in the average value of the frequency.

2nd. The speed of ordinary forms of alternating current motors varies of course directly with the frequency. As a result all machinery used for manufacturing is also affected to the same extent. If the motors are properly geared so as to drive the machinery at its most efficient rate when the frequency is normal, it is clear that any variations of the average value of the frequency will correspondingly affect the output. Even an increase in the frequency under such conditions may actually reduce the output. In a cotton mill, for instance, the looms may not run faster than certain speed without producing an imperfect product and if they run any slower than the most efficient speed they will of course produce less product. In a factory of this kind an error in the average value of the frequency of 1% may mean a reduction in the daily output of 1%, which is an exceedingly serious matter.

3rd. The accurate standardization of the frequency in independent power plants facilitates their interconnection. Obviously two stations which are running at 60 and 65 cycles respectively cannot be connected until some common value has been agreed upon and this may mean a hardship to one of the companies or its customers.

There have recently been invented some very interesting types of small self-starting synchronous motors. One form is shown in Fig. 2. A very useful kind of frequency meter has been developed by



NEW SYNCHRONOUS MOTOR
The union of this device with a very accurate clock, constitutes the frequency motor here described.—Fig. 2.

the union of one of these motors with a very accurate clock. This device, known as the Warren Master Clock, is shown in Fig. 1. The upper dial which is about five inches in diameter has two second hands revolving about the same center. One of these hands which is black is controlled by a pendulum and keeps true time with an error less than

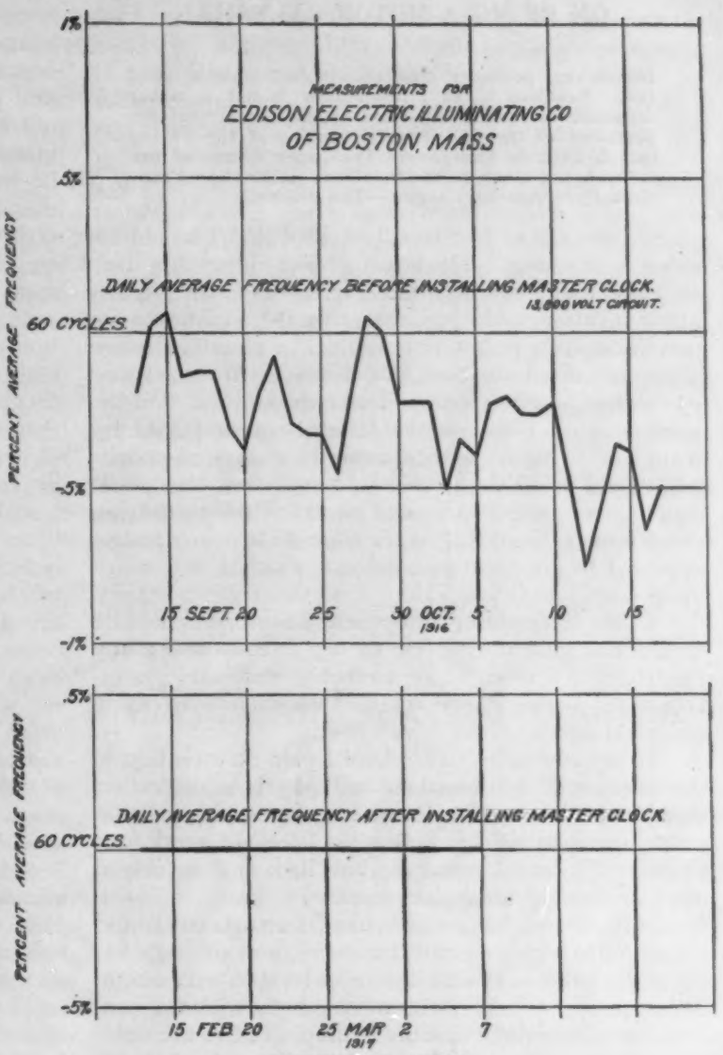
a second per day. The other hand which is gold color is directly geared to a motor like Fig. 2. The ratio of the gears is such that at normal frequency the gold hand will move just as fast as the black one.

The master clock is located at the switch-board or in a load dispatcher's office and the operator in charge of the frequency uses it instead of the regular frequency meter. From time to time he notes whether the gold hand is ahead of the black hand or behind it. If the error is more than a second or two he adjusts the governors of the tur bines slightly.

This method of regulating frequency, which is rapidly coming into use in the eastern states, saves labor for the following reason:—

The master clock indicates only an error in the average value of the frequency and is practically unaffected by momentary fluctuations. Therefore the operator observes only the tendency of the frequency to depart from its normal average value, and this is a real error of the governors which needs correction. Under ordinary conditions, however, such correction is required rather seldom,—for example, at 20 or 30 minute intervals.

On the other hand, an ordinary frequency meter indicates only instantaneous values of the frequency. Momentary fluctuations above and below the average value are bound to occur frequently in response to sudden load changes. The operator who looks at the instrument at any instant naturally assumes that it represents a condition which needs correction if it reads above or below normal. Therefore he immediately applies corrective adjustment. The next time he looks at the meter after a very short interval, he is likely to find that new correction is needed in the opposite direction. In fact, a large part of the speed adjusting which he does is worse than unnecessary, and the turbine governors themselves would produce better results if left alone for much longer intervals. The saving in labor by the master clock method is probably 50%.



BEFORE AND AFTER

The effect of the installation of a master clock is here strikingly illustrated. Note the marked irregularities with the best regulation possible under the old system.

The precision of the average value of the frequency is incomparably greater by the master clock method. Fig. 3 shows in the upper curve the average daily value of the frequency of the Boston Edison system from Sept. 15th to Oct. 15th, 1916, during which time regulation was by means of ordinary frequency meters. The lower curve which is on the scale contains no visible departure from a straight horizontal line. This shows the daily average frequency of the same system during March, 1917, when a master clock was in use. The error in the daily average value by the former method frequently ran over one-half of one per cent, and was very irregular, depending upon the temperature. The error in the daily average value by the new method is seldom greater than one five-hundredth of one per cent, and is wholly independent of the temperature.

The result of this remarkable precision is not only of benefit to a power company and its customers by reducing losses and improving the service, but it also adds a new kind of value to the service. Anywhere on the system it is possible to connect a clock driven by the same kind of self-starting synchronous motor that is used in the master clock. These motor-driven clocks will tell time continuously with the greatest accuracy, and it seems probable that they will ultimately become as common as telephones or any other electrical necessity.

RADIO STATION FOR HONGKONG OBSERVATORY

A receiving installation for the radio station, Royal Observatory, Hongkong, is now being constructed. The station is located at the observatory, in latitude 22 degrees eighteen minutes thirteen sec- in latitude 22 deg. 18 min 13 sec. N., longitude 114 deg. 10 min. 15 sec. E., of Greenwich. The installation consists of a single triangular steel-lattice mast 100 feet high. The aerial (which is on order in America) will spread from the mast to six chamney stacks of a terrace of houses 150 yards to the south of the mast.

ON BEING A MOTOR SALESMAN

BY H. P. PITTS

(Some very pertinent observations in a maze of good fun. Needless to say, the author is not a motor salesman in reality, but head of the commercial department of the San Francisco office of the Pacific Gas & Electric Company. The paper is one of the series being given at the luncheons of the San Francisco Development League.—The Editor.)

At the age of 15 years, I decided that I would become a salesman. My reason for making this decision was that I had been told that I was not fit for any other vocation, and upon analyzing the situation as to just what class of goods I would like to sell, through a process of elimination, got down to two classifications, that of dry goods and electric motors. On the final decision I choose the latter because I found I would be in touch with a more live class of people, and would probably be able to carry a larger expense acount, due probably to the electrical people having more money to spend. This expense account matter appealed to me greatly, a subject which I will touch upon later.

Upon determining to become a motor salesman I would not take the advice of my friends and study electricity. I thought it was only necessary to increase my acquaintanceship, as I considered anything electrical would probably sell itself.

In my course at high school I paid no attention to the studies of mathematics and physics, but rather clung more to the subject of languages, etc., so that when I graduated from high school I could speak four or five different languages, but had not developed much in chemistry or mechanics.

With my diploma in my hand I struck out to get a position with an electrical concern, and through being acquainted with a banker, was located with one of the largest concerns. After having been with the concern for two or three months I complained to the management because they did not put me out on the road selling, was told in reply that inasmuch as I knew nothing about the business it was my duty to study this electrical business and I was advised of a number of correspondence courses which I could avail myself of the privilege of taking up, together with good literature which was published by the company. I thought over this advice with the result that I gathered up all catalogues and publications issued by my company and took them home and spent two nights going over them but found nothing that would interest me. I made out an application to a correspondence school for a course in electrical engineering, made the first payment and studied one or two examinations, but soon got tired of that. I knew all a good salesman would have to know was to become acquainted with people and just sell. Matters went on for several years, and while I received the publications from my company, together with good reading matter pertaining to my profession, I felt that if I worked eight hours at the office during the day I was giving all the time my company was paying for, and that time after hours was my own to do what I cared to do. On several occasions I was called in to the sales manager's office in reference to my progress and felt by all these interviews I had convinced the sales manager where he was getting off at, and that I was satisfied myself that I was getting on far better than he had given me credit for.

The time came when I was to start out as a salesman, and I was given a territory in a large city. I was overjoyed. I learned later, however, that this position was given me because there were young fellows who were coming along and room had to be made for them. I was given the names of a number of concerns that I was supposed to call upon. I started out full of confidence, and the first corner I turned I dropped into a cigar store and bought a dollar's worth of cigars. I had previously fortified myself with a quantity of beautifully engraved cards with my own name in large letters and the name of the concern down in the lower left hand corner. Upon lighting a fat cigar, blew into the office of the purchasing department of the first concern on my list, and sent in my card (permitting the tissue paper to stick to the face of it). He kept me waiting ten or fifteen minutes, which treatment made me quite impatient and I sent along another card saying that inasmuch as I had been given a number of concerns to call upon that morning, and had a large stock of motors to sell, I would appreciate it if he would give me an audience. The result was that he sent for me and I rushed into his office—no one could accuse me of not being enthusiastic. He didn't seem at all tickled to see me, for he did not even stand up to shake hands with me, but I was wise to something, and the first thing I did was to blow a cloud of smoke into his face, reached out my hand to shake hands, and inasmuch as I heard older salesmen do so, called him by his first name, then poked a cigar into his left hand. He took the cigar and laid it on the ink stand and picked up several papers and began reading them and would not give me very close attention, so I told him that if he wanted to buy any motors from me he would have to pay attention to what I said inasmuch as I represented a large company. He said he was not in the market for any motors at present and that he would let me know when he wanted to see me. I sat and talked to him for probably ten or fifteen minutes, during which time he wriggled around in his chair and acted as though he was not altogether interested in me or my company. I finally thought I would make a lightning hit and invited him to go to lunch with me. He stated he was sorry he could not go with me, rather intimated that his lunches were taken up with other important matters. The full blow of this expression I did not "get" until I had left his office.

I called on all of the men comprising the list

TEN EVENTS IN THE LIFE OF A MOTOR SALESMAN

1. He specializes in languages at school.
2. He gets a job through a banker friend.
3. He takes a correspondence course, and drops it.
4. He spends his evenings as he pleases.
5. He buys cigars.
6. He calls customer by first name.
7. He tells "racy" stories.
8. He does not know his line.
9. He fails to join electrical societies.
10. He has gained a reputation.

I had been given and although I worked like a horse that day, did not sell anything, but felt quite encouraged, inasmuch as I had had an audience with each one and was told in each case that they would bear me in mind. I had heard that our sales manager had said he did not expect I would do much for the first few days, so I felt satisfied with myself.

Two or three days after I called upon my first purchasing agent again and he seemed a little more interested in seeing me, asking me questions as to the type of motors, etc., and just what we had in stock, and as to whether I considered direct current motors better than alternating current for certain types of work. I told him I did not have my books with me, but would look up this matter and report to him. He said he was in the market for a rush order and would be very glad if I could give him the information right away. I told him I was very sorry I did not expect these questions would ever come up, so would have to search in my books for the information, which would probably take a day or two because I had to call on some other men. The pressure of business made me forget to look up these questions; the result was one of my competitors got the business. This did not make me feel badly, because I knew he was a much more experienced salesman.

Upon calling upon my second man that day I found a friend, as he seemed willing to listen to several of the stories which I had accumulated; in fact, it was good ammunition to feed the purchasing agents, inasmuch as I considered their whole business was to listen to the talk of the salesman. While he listened, he did not seem to see the point of some of my stories, and did not come back with the usual "That reminds me," so I made up my mind that I would dig up some others which probably were of a little more indecent character to see if I couldn't gain a point. I left his office at about noon, and inasmuch as I had not had a chance to spend some expense money, I went and had a 25-cent lunch and charged $3.00 expense for having taken John Doe, purchasing agent, to lunch.

Upon calling in the afternoon on one man I was asked if I belonged to any of the electrical associations and upon informing him in the negative, was asked to join the National Electric Light Association. I informed him that I knew my company belonged to such associations, but thought they were not for electrical salesmen inasmuch as I felt nothing ever transpired at meetings that would be of benefit, and that I had taken precautions of increasing my circle of friends by other methods. The dues were only $5.00 a year, but I felt that I could use the $5.00 better by buying cigars and drinks for the boys than in joining any educational association.

I continued to call upon the men in my territory and the more I called, the more I was left sitting in the ante-room, word being sent out to me, "Nothing doing today." So I finally started to devise means of getting business. The sales manager had called me in on several occasions and told me that, while I was learning the business, yet I was supposed to bring in some business or show an inclination to get prospects. On the last occasion of being on the carpet, I assured the sales manager that I felt that I knew my business, for I had been with the concern for several years now, and that I noticed the general run of people seemed to like me fairly well, that I had spent a good deal of money on clothes and entertaining, and was spending my evenings among people who I thought if they did not require my goods would tell their friends what a good fellow I was. I had been years in the business, followed along these same lines, feeling I had been done an injustice by my company, in that my salary had not been increased according to the number of years I spent with them. I still received the printed matter and publications from my company and kept them well bound and dusted off in my bookcase, had not thought it necessary to bother my head as to the type of business that my prospective customers were in, thinking that that was their business, had had a number of encounters with the manager, who had taken the attitude of pitying me rather than censuring me, a lesson I did not seem to appreciate until after leaving his presence, I still depended upon the cigars and lunches to increase my business. I have proceeded along these lines until I feel that I have established quite a reputation for myself. But I have sold few motors.

UTILIZING THE WOMAN-POWER OF THE NATION

A recent bulletin sent out by The American Society of Mechanical Engineers urges local branches to take advantage of an opportunity to accomplish a real service to our country by taking prompt action in getting the industries to co-operate with the universities, colleges and technical schools in utilizing the great woman-power of the United States by educating them through short intensive courses of study as set forth in the following resolutions adopted by the Detroit Section of the A. S. M. E. and the Detroit Engineering Society, in joint session, May 3, 1918:

WHEREAS, the demands of the country for men and means to fight the war has resulted in a deficiency of skilled workers in the trades and professions; and

WHEREAS, the women of this country could with a short period of training fit themselves to fill these positions, as women have done in other countries at war; and

WHEREAS, among the things which women could do advantageously are drafting and tracing, inspection and testing of materials, both physically and chemically; therefore

RESOLVED, that the Universities, Colleges and Technical Schools throughout the land be asked to consider the question of meeting this demand by providing special courses of instruction open to women students qualified to pursue such courses; and further

RESOLVED, that employers who could use such skilled help exert their influence with their Universities, Colleges and Technical Schools, and co-operate with them in developing and making available a great body of intelligent and adaptable women who are as eager and willing to serve their country as their brothers;

THEREBY bringing about not only increased effectiveness in fighting the war, but also a greater mutual respect and a truer relationship of our men and women.

WOMEN IN THE INDUSTRY

WOMEN IN THE ENGINEERING DEPARTMENT

A recent article in the Western Electric News points out the various technical positions held by women in that company. The number of women—other than typists, stenographers and clerks—employed in the Engineering Department has been gradually increasing since about 1914. It was then that Miss Gaston, in her capacity of librarian and translator of all tongues, including the Scandinavian, and the slip-stick artists (variously known as computresses, calculators, calculizzes, etc.) made their appearance. Most of these young women were college graduates to whom school teaching was evidently not the one and only resort.

All of them were at first asigned to one group. Requests for translating, reference work and computations were made on this group. Later, when the Transmission Branch started talking in terms of impedance instead of resistance, and doing other queer things, the demand for computresses in that particular branch became so great that several girls were definitely asigned to transmission work as calculators. This, then, may be considered the beginning of real laboratory work for women.

AS THEY DO IT IN THE ORIENT

A kindergarten maintained by one of the large factories of Japan for the children of its women employees. This factory provides company dining rooms, store—even swimmnig pool as well.

In addition to computing and making electrical measurements and transmission tests, girls are also employed in the Transmission Branch on draughting and on follow-up work on jobs placed in the Model Shop — the last mentioned a most important and (with all due respect to the Production Branch) rather trying task.

The other laboratories were quick to realize the value of women for certain kinds of work, so they, too, began to cast around for suitable representatives of the female of the species. In the Physical Laboratory the experimental work on switchboard lamps and on filaments in general required deft fingers as well as agile brains.

Recently there has been a great demand for special condensers and fuses which, for various reasons, must be manufactured under laboratory conditions. This work does not of necessity call for operatives with more than average education, but it does mean the presence in the laboratory of a fairly large number of women. If any of them show special aptitude or inclination, it is a fairly easy problem to acquaint them with the workings of the simpler measuring devices and to instruct them in the making of various mechanical tests on apparatus under investigation for all sorts of reasons. Naturally, tests and measurements, as in the Transmission Branch, are a good field for the employment of girls with technical training; and so we add some more to the collection. At present the Chemical Laboratory employs two young women on routine analysis and solution work—holding out the prospect of research work hitherto delegated to men only.

Up to now the Research Branch employs fewer women than any other division of the Engineering Department. This is probably due to the fact that, as the name implies, the work of this branch is almost entirely of a research nature, although it may be because of the relentless researchers are so exclusive that they don't know the war with Spain is over. At all events, in this branch the work of the women is mostly clerical.

For girls with some technical education, classes in advanced physics and in telephone practice are held. The object of these classes is to acquaint the students not only with the general principles underlying their work, but also to present to them the peculiar problems constantly arising in the telephone field.

WOMEN IN THE ELECTRICAL FIELD

Miss Gertrude Tucker, secretary to the president of the Southern California Edison Company, has had much to do with the progressive work being carried on by that organization in regard to the education of its women staff into company ideals. With the importance of large numbers and higher positions, criticism of women's work in the electrical field is becoming constructive—and employers are recognizing that hitherto they simply have not taken the trouble to make good employees of their women workers. Among the pioneers in this constructive work should be counted Miss Tucker, who has helped organize the series of talks and women's meetings now being carried on by her company.

THE OPEN DOOR OF THE PACIFIC

(Trade with Asia has maintained a satisfactory level and although it suffers as all foreign trade must from difficulties of delivery and the export situation, it contains elements which point to a very prompt response when war conditions shall be removed. The telephone situation in Mukden is typical of the Orient—in rather poor condition with cheap equipment but about at the stage where improvement is necessary—and looking to America for better ware.—The Editor.)

AMERICA'S INCREASED TRADE WITH ASIA

The annual report of the chief of the U. S. Bureau of Foreign and Domestic Commerce, recently issued at Washington, gives figures of the enormous increase of American trade with Asia during the first ten months of 1917.

From Asia the imports into America for the ten months were $634,363,292, as compared with $437,286,584, showing an increase of 45 per cent; while the exports from America were $330,604,173, against $287,364,051, or an increase of 15 per cent.

Of course, American foreign trade as a whole has the enormous advantage of being able to show a huge credit balance. The excess of American exports over American imports for the ten months ending with October amounted to the colossal sum of $2,646,000,000, or more than the sum total of the imports for the same period.

TELEPHONES IN MUKDEN AND CHANGCHUN

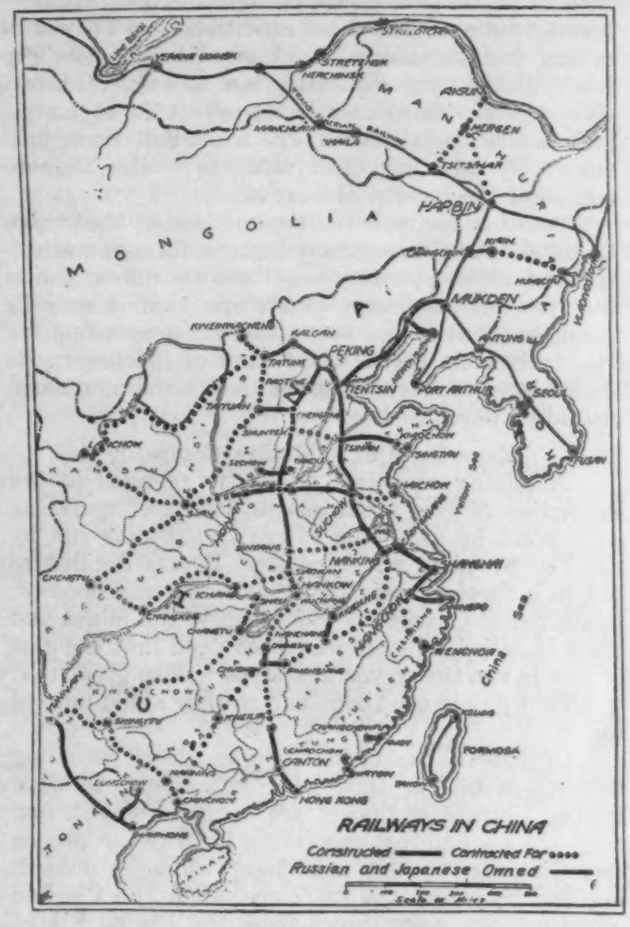
The American Consul at Mukden, China, reports that a considerable demand for telephone equipment has arisen at both Mukden and Changchun. The Chinese have a telephone company at each place, but the installations are too small, and more telephones, wire, and other supplies are needed. The demand for telephone service in this district is constantly growing, and a favorable field is offered in this connection for American exploitation. The Chinese have been buying a cheap and inferior class of telephone equipment, but they are now convinced that it pays to purchase more substantial and durable material and are anxious to buy from Americans.

The method of placing American telephones—and any other supplies, for that matter—should be in keeping with the class of goods offered. First-class selling methods should be employed for first-class goods. A fair share of the trade will never be obtained without personal representation. The manager of a local telephone company states that he is in a position to buy about $50,000 worth of telephone material, but that he wlil only do so after conferring with an actual representative of some manufacturing firm.

Mukden Telephone System

The Chinese telephone system at Mukden is owned and operated by the provincial government and has about 900 phones in use. The system maintains both local and long-distance services in South Manchuria.

There are fifteen telephone systems in various places in the Mukden district, owned and operated by native merchants and three by the Chinese Government, all of which now possess Japanese telephone equipment. All of these systems are said to be run with common magneto batteries.



PROGRESS IN CHINA

The extent of civilization of a country, a true index of its use of electricity and electrical devices, is dependent in a large measure on the ease of transportation. Note the spreading network of railways in China. The map is reprinted from Asia Magazine.

AMERICAN COMPETITION WITH OTHER COUNTRIES

China offers a growing market for various types of machinery. As a rule, however, the Chinese in Hunan who need or may desire this machinery are unable to deal directly with American manufacturers in the United States. The language is the most important factor in producing this situation. Catalogues and letters in English with their cabalistic signs describing machinery and prices f. o. b. some city in the United States which is unknown to the average Chinese are almost utterly useless.

Banking and the Exchange Problem

The lack of adequate banking facilities and the exchange problem also are factors. The average Chinese merchant at Changsha finds it well-nigh impossible to establish credits in the United States to cover purchases, because of exchange conditions. As business is on a silver basis, purchases must be made and paid for in gold, and experience shows that he is likely to have difficulties if a sudden fluctuation occurs in the exchange value of silver between the time he sends the order and the time he receives his machinery. For this reason he prefers to go to locally represented foreign manufacturers who understand his condition, who know him or can find out about him, and who will give him fairly liberal terms to enable him to buy. The foreign representative also is an expert in exchange, and is able to take the risks attendant upon purchases of this sort, and thus save the Chinese merchant the incidental worries.

Another factor is the general lack of knowledge on the part of Chinese merchants of foreign machinery and its uses. The merchant or miner knows that foreign machinery exists and that it may be purchased, but it is a very different proposition for him to be able to tell what kind of machinery he should have to meet his special needs and how much should be purchased.

Experience of a Mining Company

A mining company which is engaged in the extraction of gold from quartz had been operating with profit by using the native stamp mills run by hand or by weak water power. It was decided to put in a foreign stamp mill, and one was ordered. It arrived at Changsha, was taken to the mines and there installed, when it was discovered that the cost of fuel to run the powerful stamps was so great that it did not pay to use them, and so they stand unused today.

Of course, the Chinese merchant is becoming better equipped as time goes on. Young foreign-trained Chinese engineers are being employed, and they are learning by experience to draw up proper specifications for new machinery which is needed, but the time has not yet come when the Chinese merchant can order direct from the United States without risk. As a result he prefers to go to the local representative of a foreign manufacturer and order machinery through him.

German and British Representatives

It has been the practice of our German and British competitors in this field to have on the ground experienced engineers, who can investigate the needs of the Chinese merchant and give him advice as to the kind and quantity of machinery that he needs. Generally speaking, these firms also export Chinese raw products, and through the assistance given them by their own banks they are enabled to offer easy credit terms to the Chinese merchant.

WAR CONDITIONS AFFECT CHINESE TRADE

Imports of machinery of various sorts into the South China field during the past year have been disappointing, according to the American Consul at Hong Kong, but on the whole the decrease in trade has been due as much to conditions as in the United States and Europe as to conditions in Hong Kong and various Chinese ports. In various districts about Hongkong political and other troubles have so unsettled conditions that new enterprises are undertaken only with reluctance, and a normal demand for machinery in all lines can not naturally be expected. On the other hand, orders for various lines of machinery actually placed abroad have not been

Methods of transportation in the Orient are not wholly electrical

filled because of war restrictions or because of general conditions in the trade.

Delay in Delivering

An electric-light and power company in Hongkong has been waiting for many months for engines and dynamos for its new power plant ordered in Great Britain. The company lately has been considering the matter of purchasing its machinery in the United States, but so far no decision has been reached, and it is doubtful if the plant could be secured in the United States under present war restrictions. In the meanwhile the company can furnish no increase in its service and has prohibited the addition of any power machinery on its circuit. This has prevented trade in electrical machinery for local use for some time and will prevent the importation of any such machinery until additional electric current may be had. All over South China small electric-light and power plants have been introduced, but most of them need replacing or overhauling, which can not be had at the present time because of high prices, high freights, and the general embargo on such machinery. The trade in motors, mostly marine, is being greatly influenced by the increasing success of Chinese and other local manufacture of ordinary internal-combustion motors and engines. Much of the ordinary trade in this line will in the future be local. What actually can be done in Hongkong in this line may be appreciated from the fact that all engines, dynamos, motors, and even propellers and mountings for a 10,000 ton ship launched in Hongkong some time ago were made locally.

What machinery has been imported during the past year has been very largely American.

CURRENT RATE FIXING PROBLEMS

BY C. E. GRUNSKY

(With the increasing development of hydro-electric power, the problem of water right values is coming to be one of the important items in valuation and utility rate cases. As the practical value of the water right is obviously dependent on the earnings allowed upon it by the courts, the establishing of a definite policy would relieve experts and regulating bodies of much embarrassment. A careful analysis of the rights of the case is here made by an engineer who is a recognized authority in valuation matters.—The Editor.)

THE VALUE OF THE WATER RIGHT IN ITS RELATION TO THE RATE BASE

In concluding the foregoing article a reference was made to the economic value to society which results from the development of the energy in flowing water. Any one who engages in the business of controlling and marketing this energy deserves not only adequate protection of his investment, but also some reward for doing that which conserves other valuable natural resources.

Under this view, even when the water right which makes the development of power possible would appear to be without market value at current fuel prices, it will be reasonable to allow to the owner not alone a rate-base increment equal to the cost of securing the water right, if there has been any such cost, but also, if this cost has been legitimate and reasonable, a fair excess allowance in the earnings, perhaps proportional to the amount of power developed rather than to the actual investment in works for developing and marketing this power. But this can only be done within limits or so long as the rates for the service remain reasonable. When it would require excessive rates, the owner must sffer the penalty of having made an untimely if not an unwise investment.

It seems hardly necessary to add that the national and state policy should be to grant liberal terms, and even to assure a bonus in special cases, to those who in proper manner and on a scale commensurate with physical conditions and with industrial and other requirements will enter upon the development and marketing of the energy in the flowing stream. The wise policy would be to grant terms which will assure a fair profit, but under which, after a reasonable time, preferably about 50 years, which is a short period in national and state life, the control of the water power and the power plant itself with all accessories will revert to the government, so that then, if it appears desirable, new terms of use can be agreed upon. By such a liberal policy the early development of water powers will be assured and the utilization of energy which nature annually replenishes will help to conserve that which must otherwise be obtained by the inefficient consumption of a limited store of oil and coal.

Additional Illustration of Strategic Value

As an illustration of special water right value the case of a water supply for general and domestic use may be taken, which affords water of prime quality in limited amount, but which, when compared with other sources in use in the same community, has the advantage of proximity, elevation and reliability of service.

Let it be assumed, for example, that such a supply was the first to come into use, that its water was distributed, as required, throughout the built up section of a growing town, but that at length a time came when additional water had to be brought in by a second system from some remote source, and that, at the time of a valuation for rate fixing, the distributing pipes of each of the two systems cover practically the entire built up territory. The original water works may now be supplying only a small fraction of the aggregate amount of water being used. Undoubtedly under such circumstances, the charge for water by the two concerns would be the same, or very nearly the same. The water from the newer works could not be supplied at a low enough rate to drive the earlier concern out of business. Without any reduction of rates, the original utility should be considered as a privilege similar to a franchise and should be treated accordingly.

It must be remembered in this connection, however, and in any analysis of this character, that the advantage that one concern may have over another in the excess of net earnings compared with interest on the investment, is to be applied to all elements of value in excess of the capital actually invested and can not always, as above assumed, be assigned to water rights alone.

The Life of the Right Affects Its Value

The water right as thus far discussed applies particularly to the right to put water to a continuing beneficial use without limit as to the time during which such right may be exercised. There will be cases of reversion of the right within a fixed time to the people who have made the grant thereof and there will be other cases in which a superior supply of water, later to be developed, may at some time throw the original source out of use altogether or leave it available for only inferior uses. Where a water right thus or otherwise limited in its life is to be valued, the question not only arises as to whether it has strategic value, but also what effect time will have upon the value.

Earnings Create Value

The value of any water right in excess of its cost, like the value of a franchise, results as already stated, from earnings in excess of ordinary interest on the investment. This value is, therefore, directly dependent upon the rates established by the rate fixing bodies, or in the case of operation under a franchise, upon the rates limited by the terms thereof and limited by the further requirement that they must not exceed 'what the traffic will bear.' Large power is in the hands of the rate fixing authorities to make or to destroy the value of water at its source and until a definite policy has been adopted by such authorities,

there will continue to be more or less uncertainty relating to such value. The real value of property of this character will, for the present, remain somewhat speculative, particularly in cases where the development of the water or of a water power lies in an uncertain future. This can hardly be otherwise because it is not yet certain that the tendency of today to allow something when value is made the rate-base for the water right in addition to cost will be adhered to. When it is generally understood that such an allowance, practically as compensation for making the development, will be made and when the amount thereof to be expected under ordinary circumstances can be approximated, the valuation experts will be relieved of much embarrassment.

In the case of the established utility, much of the difficulty ordinarily encountered when water rights or franchises are to be valued will fall away if the method of procedure in fixing rates which the writer recommends be followed and the invested capital and not present value be made the rate-base.

The San Francisco Rate Case

Since the above notes on the value of water rights were written the report of the Standing Master in Chancery, Mr. H. M. Wright, in the case of the Spring Valley Water Company vs. City and County of San Francisco (rate case) has been filed with the court (Oct. 17, 1917) and merits notice. The Master says on the subject of valuing water rights:

"The valuation of the plaintiff's water rights is considered by counsel for both parties the most difficult single subject in this litigation. * * * There is little or nothing in the way of decided cases to afford a guide to the principles of such a valuation."

In speaking of the value assigned to a right of property, additional to that of the land and structures which its exercise requires where it cost nothing as a historical fact, the Master says:

"Such is, in essence, and often in fact, the right to appropriate water. I have been especially struck with this peculiarity of this right of property because I have never seen anything like it among the various rights of property or elements of value that usually enter into the properties of a public utility subject to appraisal. Usually the elements of value have been the result of expenditure, and would cost money to reproduce; or, if they cost nothing as by gift or adverse user, would be the subject of estimated cost in the reproductive method. Here in any view, the right arises by the act of diversion. Like the miner's right, it is a valuable right conferred by the United States, and in the case of water by the State also, to him who finds and takes. And just as the miner has in his mining claim, after discovery and location, a property which may possess value in exchange far beyond his expenditure of labor and money thereon, so the appropriator has in his right of diversion, a right separate from his rights in lands and structures, and which may in a given case have a sale value far beyond his expended costs. And in the normal case, the value upon which rates can be earned is the exchange value in the market."

The doctrine of riparian rights was established in California as a rule of law when the State Legislature in 1850 declared that:

"The common law of England, so far as it is not repugnant to or inconsistent with the Constitution of the United States, or the Constitution or laws of the State of California shall be the rule of decision in all the Courts of this State."

Referring to this fact the Master says:

"It may be doubted whether by intention of the legislators of that early day, or by the language employed, the riparian law was established along with the antithetic existing water system of appropriation. We need not follow the history of this question as to the existence of the riparian rule in this state through the years; it was established as the law in the common law form of statement, by a divided court in the great case of Lux vs. Haggin (69 Cal. 255) decided in 1886."

The Master then calls attention to the fact that in certain substantial respects the application of the riparian doctrine has undergone extension and modification since the Lux v. Haggin case was decided. It has been extended to apply to underground waters and as against an appropriator from a stream to the owner of non-riparian land overlying gravel supplies fed by that stream. It has been modified so as to restrict the riparian right to limits defined by actual or possible beneficial uses upon the riparian land. After further discussing the rights of the riparian owner the Master continues:

"I have reviewed the law of this state underlying the anomalous situation arising from the existence of two radically inconsistent systems of water law as a basis for concluding that in valuing a right founded on appropriation we will reach correct and consistent results if we disregard all attempted distinctions drawn from controversies between riparian proprietors and appropriators; in other words, value the right as if the riparian law had never been in effect."

Without attempting to follow the reasoning of the Master at the full length at which presented in the report, it may be stated that in conformity with the view held by the courts that fair value must be the starting point when the sufficiency of earnings is in question, the Master holds:

"That the fair market value of plaintiff's rights of diversion, as a whole, during the respective years here in question, is the proper standard of valuation for rate fixing purposes; that the extent of the right is to be measured by the extent of its utilization, that is, the yearly supply to San Francisco in any year, less the amount derived from the Pleasanton sources" (underground waters); "that the Pleasanton supply is properly included by an allowance, in the capital value, of the market value of the Pleasanton lands as a whole."

Giving weight to the evidence submitted in this rate case including the facts in a local recent transaction which included the right to 1,000,000 gallons of water per day and to the findings of Judge E. S. Farrington in the earlier Spring Valley Water Company rate case in which a value of about 63,500 per million gallons of daily delivery was found for 1903, the Master reaches the conclusion that the unit water right value to be applied to the actual draft of water from the various sources of supply in use by the Spring Valley Water Company was $75,000 per million gallons per day in the years 1907-8 and 1908-9; $80,000 in the years 1909-10 and 1910-11; $85,000 in the years 1911-12 and 1912-13 and $90,000 in the years 1913-14 and 1914-15. This valuation applies to amounts of water ranging from 26.5 million gallons per day in 1906-7 to 34 million gallons per day in 1914-15. It does not apply to from 5 to 7 million gallons of water per day obtained from the Pleasanton wells whose value was included by the Master in the market value of the Pleasanton lands whose ownership was acquired to secure the water.

FUEL OIL AND STEAM ENGINEERING

(Conservation of fuel oil is a matter of vast importance in the West. One of the best ways to accomplish constructive conservation is to more intelligently burn the oil in the industries. Here is an article by the technical adviser for the fuel oil administrator of California, who is on the engineering staff of the U. S. Bureau of Mines. The movement deserves the strongest support from all quarters.—The Editor.)

THE NEW FUEL OIL PLEDGE CARDS

BY J. M. WADSWORTH

The United States Fuel Administration empowered to administer and conserve the nation's fuel resources is confronted with tremendous problems allied to a part of nearly every industry. To a great extent, its success is contingent upon the voluntary support accorded its work by the public and users of fuel.

Prodigal waste of our fuel resources is apparent in the industries at all sides—due in part to rapid growth overshadowing plant economy considerations, but very largely due to lack of appreciation of engineering principles in plant design and operation. The combustion of fuel for the conversion of its stored heat energy to useful work is a science requiring the application of engineering skill and knowledge for economical and successful results. Not all users of fuel possess this knowledge to the extent desirable for best practice.

PLEDGE CARD FOR UNITED STATES FUEL ADMINISTRATION

Prepared by J. M. WADSWORTH of the United States Bureau of Mines

Owner's Pledge	Operator's Pledge
1. Install recording instruments; they make possible an accurate knowledge of plant operations, and will pay for themselves.	1. Watch air admission—a hazy stack ordinarily indicates more economic conditions than does a clear stack.
2. Institute bonus system of firing contingent on minimum CO_2 reading from flue gas analysis.	2. Get CO_2 reading on flue gas, if possible, to determine position of air and stack dampers for different operating conditions.
3. Do not be misled by efficient boiler performance into regarding your entire plant efficient. The greatest losses occur in utilization of steam and the heat of the steam should be conserved to the fullest extent by the efficient operation and selection of machinery.	3. Remember forced firing means high stack temperatures and consequent waste.
4. Chart daily plant performance.	4. Systematically clean boilers and settings. No boiler is an efficient steamer when fired through sooty or scaled tubes.
5. The installation of feed water heaters, economizers and superheaters for regenerating waste heat where possible, are strongly recommended and will pay dividends.	5. Remember it requires 18-20 hours to heat boiler settings to their maximum temperature. Avoid unnecessary shut downs.
6. The insulation of steam piping.	6. Study pamphlet issued by this administration on application.
7. Recovery of latent heat from exhaust steam	7. Welcome the bonus system of firing, as it puts the matter of firing on a business basis.
8. Preheat air for combustion requirements.	8. Watch steam requirements by main machinery, immense wastes are attributable to radiation, friction and condensation in the utilization of steam.
9. Do not use boiler compounds where outside treating plants are feasible.	9. Regulate the feed water to uniformity where possible.
10. Adopt a burner to meet your furnace requirements.	10. Save exhaust steam and recover the latent heat from it.
11. Determine proper temperature to heat fuel oil for viscosity permitting maximum burner capacity. Do not heat above this.	11. Note the furnace condition, if heating surfaces are too close to the fire proper combustion is not possible.
12. Efficient plants evaporate 14-16 pounds water (from and at 212°). Does yours? Thermal efficiency of 74-84%.	12. Do not overheat fuel oil. The point where the viscosity allows maximum capacity of burner is the proper point.
13. Recognize the value of the fuel engineer in the economical operation of your plant.	13. Be sure your plant records are accurate for your own protection.
14. Study the pamphlet issued by this administration on application.	14. Watch the boiler setting for possible air leaks.
	15. Co-operate with your employer in this campaign, it means more money for both of you and is a patriotic act of conservation.

KEEP THIS CARD FOR REFERENCE

The foregoing is the pledge you have signed to aid your Government in Conserving Fuel Oil.

"MAKE EVERY GALLON COUNT" and aid the United States Fuel Administration in the good work that it is doing.

Meetings are arranged, where trained men give talks, illustrated by instructive motion pictures, showing proper methods of firing and eliminating wastes. Engineers are inspecting plants, meeting the operators, and conducting efficiency tests to encourage and foster the work. Instructive literature is being distributed to the industries, and the support of the public solicited.

NAME OF COMPANY ..... PLANT PURPOSE .....

LOCATION .....

1. Name and type of boilers used	Manufacturer. Water tubes or fire tubes.
2. Number installed	Number in battery. Number of batteries.
3. Complete description	Number, length, size, and thickness of tubes and headers.
4. Superheaters	Make, type, and heating surface.
5. Economizers	Make, type, and heating surface.
6. Feed water heaters	Make, type, and heating surface.
7. Water softeners	Make, type, and heating surface; analysis of water.
8. Main machinery drives	Complete description—size of engines—what pressure under and exhausting to what press.
9. Auxiliary machinery	Make and size of oil and feed water pumps, electric light generators, etc.
10. Stack and setting	Size and height of stack—material—number of pasets in setting for gases.
11. Recording instruments in use	Pyrometer, draft gauges, CO_2 meters, etc.
12. Shift and number of operators	Number of men and length of shift.
13. Daily plant requirements	Gallons of fuel oil, its gravity and flash; gallons of water.
14. Daily production of plant	In units of article made
15. Operating temperatures and pressures	On boilers and machinery drives and all representing machines (4, 5, 6).
16. Total length and size of steam lines	All main steam lines and how much insulated.
17. Cooling system	Description of towers, amount of water cooled, temperatures, etc.
18. Contemplated increase of capacity and improvements	Size of future plant units contemplated for addition. Why?
19 Where do you think biggest fuel waste is in your plant?	
20 How can it be remedied?	Answer fully.

NOTE: Use a separate sheet for answers where necessary, noting number of item.

Questionnaire for the Power Plant

Users of fuel are eagerly taking advantage of the opportunities offered. The fostering of this work primarily as a war measure, cannot fail to react to the permanent and lasting benefit of the industries.

The Petroleum Division of the Administration has work of extreme importance. Oil fuel must be supplied to our navy and the allies, for oil fuel is essential to maintain an invincible navy. Also vast quantities of petroleum products must be supplied by the oil fields of the United States for motor trucks, airplanes, ambulances and other war service.

In 1917, the consumption of petroleum in the United States exceeded production by 5 per cent. This year the difference will be much greater, and must be made up by more economical use of the product at home, as well as intensive development work. To this end the whole-hearted support of the public is vital.

The California Fuel Administration has begun a pledge card campaign to initiate their educational work. A facsimile of the card is printed with this article and the promptness with which the signed pledges have been returned is very gratifying and encouraging.

In connection with the pledges on the card, the Administration will distribute a pamphlet on Oil Fuel, compiled by the United States Bureau of Mines, which contains information of frequent use to oil engineers and amplifies the suggestions on the

card. This pamphlet is now in press and may be had very shortly upon request to the California Fuel Administration.

The cards returned form an index to all the industrial plants of the State, and furnish sufficient information about the plants to assist the Administration engineers in locating plants requiring attention. A capable combustion and steam engineer will visit these plants to make a detailed study of them in an effort to reduce fuel oil requirements. This work will be done in co-operation with the owners and operating force. The owner will receive the benefit of engineering advice in the plant operation, and the operating force the privilege of putting their problems up to a specialist in this line of work for solution.

Finally, it is hoped that the various plants signing pledges will submit monthly statements to show the amount of fuel oil consumed per unit of the manufactured article, or of steam generated, during that month. In this way each plant will be encouraged to watch their requirements, and the Administration acquainted each month with tangible evidence of the work accomplished.

FUEL OIL STORAGE

During recent months considerable investigation has been made looking toward conservation of fuel. In California, Governor W. D. Stephens appointed a notable committee consisting of Max Thelen, who is president of the California Railroad Commission, as chairman, David Folsom, professor of mining at Stanford University and Pacific Coast fuel administrator, and Eliot Blackwelder, professor of geology at the University of Illinois, in order that a study might be made of the conservation of fuel in the West. During the latter part of 1917, this committee made an exhaustive report and dealt with the situation in a masterly manner. So important are its findings, that the conclusions and recommendations of this committee are here reproduced in full:

Crude oil stocks in California have fallen from 57,147,000 barrels on December 31, 1915, to 44,036,000 barrels on December 31, 1916, a reduction during the year of 13,110,000 barrels, or 23 per cent.

Standard Oil Company reports that during the first five months of 1917 the field and pipe line crude oil stocks of all companies were further depleted as follows:

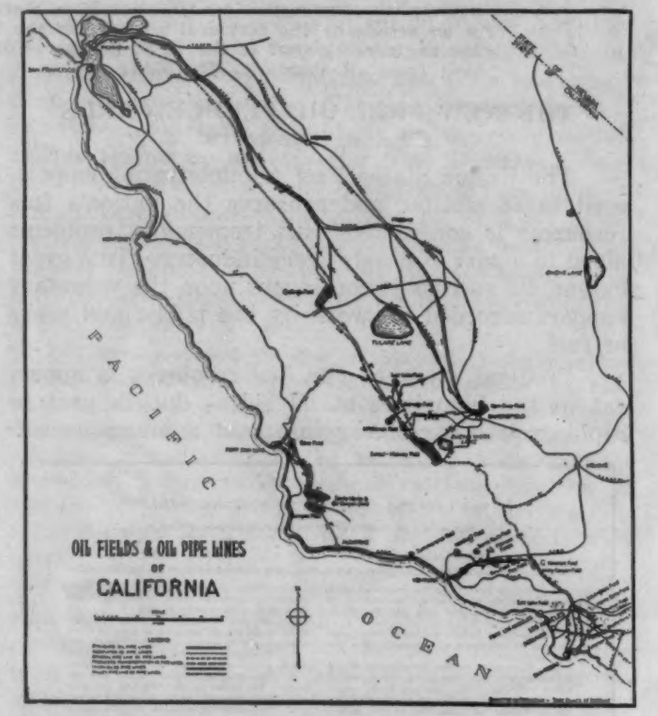
1917—	in Barrels.
January	976,036
February	1,031,960
March	854,333
April	1,197,475
May	1,355,318
Total	5,415,122

The total remaining storage on June 1, 1917, is reported to have been slightly in excess of 38,000,000 barrels.

A portion of the crude oil in storage can not be utilized because it is located below the outlets of tanks and reservoirs or is being used for the operation of oil pipe lines or for other reasons. Of the total stocks on June 1, 1917, not in excess of 32,000,000 barrels were available for use. Of this amount, 12,000,000 barrels were refining oil and would yield approximately 7,000,000 barrels of residuum. On June 1, 1917, there were available from crude oil stocks approximately 27,000,000 barrels for fuel.

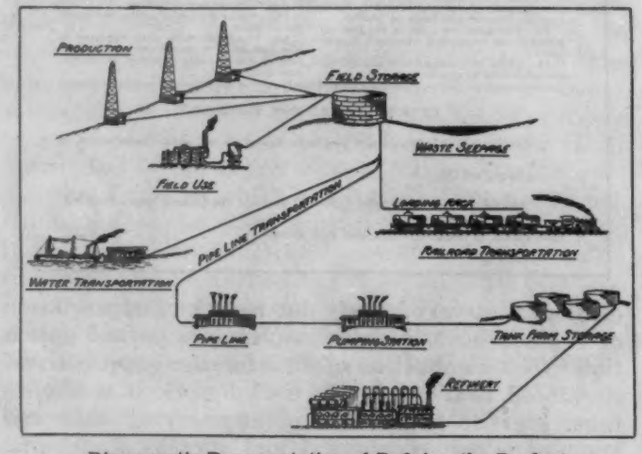
If the present excess of consumption over production, amounting to an average of 1,083,000 barrels per month, continues, the entire available storage of California fuel oil will be exhausted by June 1, 1919.

If a margin of safety of 10,000,000 barrels of fuel oil is maintained, and if the present relationship between production and consumption continues, the margin of safety for fuel oil will be reached by September 20, 1918.



The Oil Fields and Pipe Lines of California

If consumption is materially increased, as seems likely, both because of normally increased requirements, as well as the extraordinary requirements of the war, or if production decreases, as seems likely unless the relief herein recommended is given, both the margin of safety and the complete depletion of all California stocks will be reached considerably prior to the dates indicated.

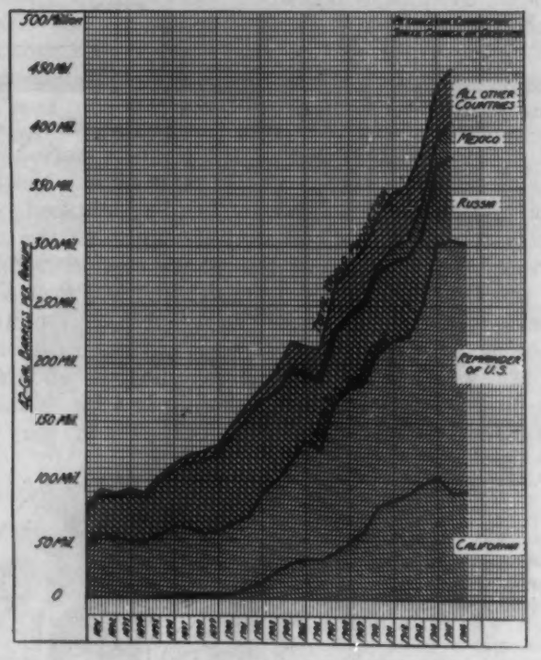


Diagramatic Representation of Refining the Product

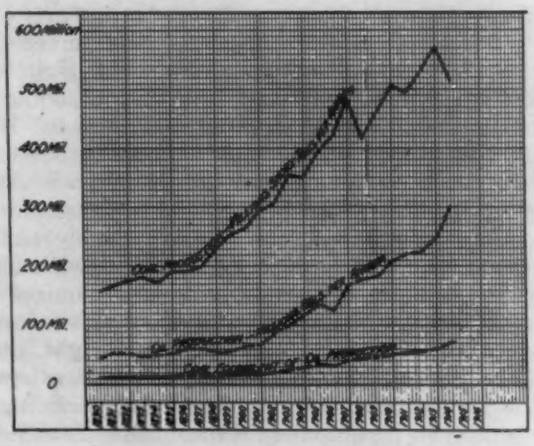
The principal railroads of California, with the exception of the Southern Pacific Company, have made the necessary arrangements to meet their requirements for at least one year.

At the present rate of production by Kern Trading and Oil Company, the Southern Pacific Company's fuel oil bureau, bearing in mind also the purchase of fuel oil by the Southern

Pacific Company, including 1,000,000 barrels bought from Union Oil Company and not as yet drawn on, and bearing in mind also the Southern Pacific Company's consumption of fuel oil, the Kern Trading and Oil Company's storage of fuel oil will be exhausted by December, 1917, unless the recently augmented drilling operations of Kern Trading and Oil Company increases the Southern Pacific Company's production and unless the Southern Pacific Company effects a substantial saving of fuel oil by converting to coal those portions of its system which are located in proximity to the coal fields of Washington, the Rocky Mountain States and New Mexico. If the receipts of fuel oil by the Southern Pacific Company decrease or its consumption increases, the depletion of its stocks will occur before December 1, 1917.

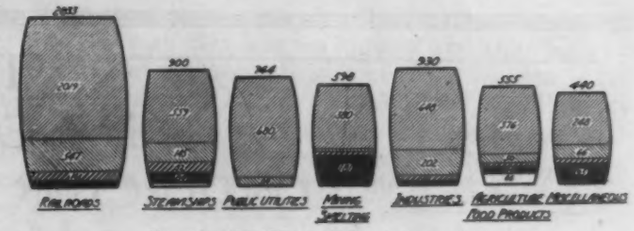


Graphical Display of Petroleum Production



Comparison of Coal and Fuel Oil Production

If the Kern Trading and Oil Company's storage should be exhausted, it would be necessary for Southern Pacific Company to enter the market to purchase oil from general stocks in storage, which amounted on June 1, 1917, to slightly over 38,000,000 barrels. These stocks are owned principally by Standard Oil Company and Union Oil Company. If these companies should be unwilling to sell to the railroads fuel oil from their storage, we assume that the federal government



Comparative Uses of Crude Petroleum

would have the right to commandeer the stocks and to compel their delivery for the operation of the railroads as long as the stocks hold out. Such action, if on a large scale, would necessarily deprive other important industries of petroleum and its products.

RECENT EXTENSIONS IN CHINESE POWER PLANT

The normal growth of Canton as a leading center in south China and its prospects for the future have led the Kwangtung Electric Supply Co. to decide to increase the capacity of its plant. A contract was signed recently with a firm of American engineers and contractors for the purchase of two American high-pressure noncondensing turbo-alternators, rated 2,500 kilowatts, three phase, 60 cycles, 2,300 volts; one American high-pressure noncondensing turbo-generator, 35 kilowatts, 125 volts, direct current; switchboards, pumps and other accessories. The contract also calls for four 750-horsepower Babcock & Wilcox boilers.

Demand for Electric Power

The extension of the plant under this contract will be made with the object not only of supplying the city and its environs more extensively with light, but also of furnishing electric power for the various industries that have developed here during the past few years. As new customers were continually presenting themselves, the increase of business called for additional equipment. The project for enlarging the installation, however, was postponed from time to time, on account of the scarcity of freight space, the increasing cost of coal, and the rising price of electrical machinery, fittings, and materials, all of which are manufactured outside of China. When the additional machinery and supplies are installed the Canton plant will be the largest in China except at Shanghai.

In addition to Canton, electric-power plants have been installed in many other cities and towns of this Province and of the neighboring Province of Kwangsi. The present enhanced prices of kerosene are greatly adding to the number of electric-light patrons, and insure good prospects for these ventures. The electrical equipment of the installations was purchased for the most part in the United States, while the engines came from England.

The subject of future power development in all parts of China is a question of vital interest to the future growth of the republic. Native coal fields are known to exist in many sections of China but the prolific water powers of the great interior possess such untold possibilities for future development that other sources of power generation fade into insignificance in comparison.

BUSINESS BUILDING
SELLING IDEAS
DISPLAY

WITH THE ELECTRICAL CONTRACTOR AND DEALER

CONSTRUCTION KINKS
COST KEEPING
ESTIMATING

ODDS AND ENDS OF SELLING PSYCHOLOGY—THE GENUINE BARGAIN

BY H. A. LEMMON

(The principle of the genuine bargain is at the bottom of all sales—that is, you always sell your customer what he thinks he wants more than the money he parts with. A realization of this principle should determine the effectiveness of advertising. The author of this entertaining article is sales-manager of the Truckee River Western Electric Company of Reno, Nevada and a specialist in advertising matters.—The Editor.)

There are times when a very little thing may seem worth all you possess.

ESAU traded his birthright for a square meal. He was weary and hungry. He probably fully appreciated the value of his prospective property rights; but at the time his mind was so influenced by pressing necessities that the birthright dwindled in perspective until its value, compared with that of a dish of breakfast food, sank into insignificance.

Brother Jacob selected the psychological moment to put over the swindle and it is interesting to learn that having done so developed into a most capable horse-trader and trickster, continued to wax fat, happy and prosperous, and become a leader of his people, besides having a ladder named after him.

Grand juries and police courts are more of a pest these days to men of the Jacob type than they were in his time, so we can hardly adopt his methods and continue in the pursuit of liberty and happiness, but that transaction comprises the first recorded application of a great principle which plays a part in almost every sale of electrical devices—the one of relative values as between service and money. And though we may question its ethics as applied by Jacob it now constitutes the one legitimate genuine bargain principle of modern, honest salesmanship.

Like Jacob we endeavor to make other considerations outweigh the one of a certain number of pieces of money. We offer the housewife a suction cleaner. Perhaps our price is $35. To make the money appear insignificant by contrast we elaborate the satisfaction and convenience which possession of the cleaner will give until finally the machine appears more desirable than the coin; then we swap possessions. If we have not misrepresented—and misrepresentation is a confession of mental poverty—we have conferred a favor upon our customer by arousing her imagination until she makes the purchase.

It is as though two moving picture films, one of the $35 and the other of the cleaner, were being projected upon a screen at the same time. Neither would stand out clearly enough to be identified. As salesmen we endeavor to shut the light off the machine which is projecting the money so that nothing but the device will be distinguished. We first seek to accomplish this by substituting for a mere picture of the device itself, one of it in use in her own home. We study our lady and decide quickly,—and let's hope unerringly—whether a saving in time or labor will more strongly appeal to her. Or it may be

Your task as an advertiser is to make the picture of the dollar sign which is in the customer's mind, fade out and leave only the vivid impression of the comfort she is going to get out of her electric iron or vacuum cleaner.

because a neighbor has one, or perhaps she feels that the baby gets too much nutriment out of a handswept carpet. We don't, however, throw on all of these pictures, because if we do we are quite likely to have a greater confusion on our screen than we started with. Having selected the right one, however, the money picture begins to recede and the home picture comes out in great distinctness. If we select the wrong one it fades back into money. Having been fortunate, however — or understanding our business, which is one and the same thing—our lady suddenly realizes that the money picture is getting dim. In an effort to recall it with all of its original distinctness she hurriedly enquires the price of the cleaner and if you give her this information the sale is likely to be half lost right there. You evade this attempt to conjure up a bugaboo by tactfully ignoring the question and painting in stronger color the home scene, until finally the screen contains nothing else and the money film is out of business. The sale is made if you have substituted the idea of service for the idea of money. You have not sold her a cleaner at $35 because it lists at $40, but have sold her a picture of leisure, enjoyment, cleanliness, or whatever it may be, which overshadows that of a certain number of metal discs.

Several years ago an Indian ran amuck—so the story goes—killed a number of white people, and

took to the hills with a bunch of equally unpleasant tribesmen. The army of the United States was kept busy some months trying to capture him without success.

An old fellow who didn't know enough about tactics to wear any decorations believed he could solve the problem. He had a long talk with the renegade's son who was in the army post. That Indian boy could count up to twelve. The old scout offered him five cartridges and a rifle if he would go out and bring in his father's head. The boy was an affectionate sort of a son and indignantly spurned the offer. So the scout offered him six cartridges, and seven, and so on, until he reached twelve. He

You may like brunettes where the author has described a blonde. That is why, in story writing, as well as in advertising, it is better not to be too specific in describing the picture, but to leave something to the imagination.

thought he detected signs of wavering and at this point recklessly made it thirteen. The young Indian accepted without further ado and a few weeks later brought in a sack which contained the desired trophy. The boy couldn't visualize so large a number as thirteen, just as few of us can visualize one million dollars, for example. In selling we recognize this principle by reversing it, with the idea of preventing visualization of the sum required, as in the case of the two pictures, but as the matter of price must come up some time, however skillfully we minimize its importance, we like awake nights preparing chocolate coatings for it.

The lady who bought the suction cleaner from us may have written a check. Can we believe she would as readily have parted with the thirty-five dollars had that sum been in quarters or even in silver dollars? Because the sum in its entirety is one that may compel recognition of its comparative magnitude, we frequently do not mention it at all as a total, and instead of "this cleaner is sold for $35," we say rather, "You can do all of this in your own home by merely paying only five dollars down and five dollars a month for six months."

Being an average human being possessed of the average human mind $35 in cash and $5 per month for seven months represent two entirely different and not-to-be-compared sums.

A well-known hoe-type safety razor which has been nationally advertised and sold at $5 is offered by a local dealer at $3.50. It is only an "apparent" bargain to a young girl. It is a genuine bargain for the man who shaves himself and chances to be in need of a razor. It is a genuine bargain to him even if he pays $5, for in either case he is not purchasing a razor but a means of removing his beard. The girl would be merely buying a razor.

A suction cleaner in itself is but a few pounds of copper, aluminum, sheet steel, wire and fibre. How can we expect to sell such a conglomeration of junk to any intelligent woman? Yet that is just what many of us try to do. Let us instead endeavor to sell her a clean house, leisure, ease, enjoyment, etc., and see what happens.

And in picture making we must not go into too much detail. Merely a suggestion here and there. If I were to write a story, and, because you had been caught in some reprehensible act you were forced to read it, interest would probably center about the heroine. If I described her as a charming blonde, with baby blue eyes and cupid-bow lips and pale pink ears, etc., I would be attempting to force on you my ideal of a beautiful girl who probably wouldn't be beautiful at all to you. It may be that your ideal type is a brunette. At least it is certain that we will not agree on all details of feminine perfection. If on the other hand I describe her rather vaguely as beautiful, and charming and sweet, etc., then you will immediately supply the details of the picture yourself, and I will have provided you with just the type you admire. In other words, in one case my suggestions enable you to paint the picture and in the other I painted it for you. So we suggest things that will cause the prospect to picture pleasure, or the comfort or the satisfaction a cleaner will give her, and thereby inspire her to furnish the details and personal application out of her own mind and her own experience with a result immeasurably more convincing than anything we can force on her.

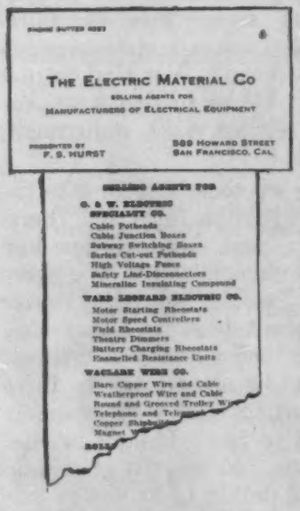
To state in our advertising or our selling talk (and they are one and the same thing) to a lady to whom we wish to sell a toaster that if she purchases she will no longer have to trudge back and forth between the kitchen stove and the breakfast table, to say nothing of burned fingers, etc., is painting the picture for her—in other words describing the heroine. If on the other hand we say that with an electric toaster she may sit at the breakfast table and visit with the family, we force her to paint her own picture which will include all of the things we could suggest and many more which appeal and apply especially to her. The first method is perhaps not so bad but the second is more subtle—and, well, it will sell more toasters. Incidentally we will have suggested a pleasant thing which her own mind has contrasted with the unpleasant and that is very desirable.

A NEW USE FOR A TOASTER

A new use for an electric toaster has been discovered by a hatter who employs it to heat felt pads with which he brushes his hats before handing them to the customer. This not only cleans them, but also gives them a rich, glossy surface which improves their appearance.

Western Ideas

AN INGENIOUS BUSINESS CARD which combines the essentials of name and company with a brief catalogue of business information has been worked out by F. S. Hurst of the Electric Material Company. The card represents the ordinary business card in first appearance and is in no way undignified. Attached to the back, however, is pasted a slip some six or eight inches in length, slightly narrower than the card itself, on which is printed the names and line of the various manufacturers represented by the company. This folds back upon itself in accordion fashion, very neatly, the whole thing being held in place by inserting the edge under a little flap cut in the material of the card itself.



ILLUMINATED POSTERS were used to good advantage by a western dealer in a recent show window as reported by Signs of the Times. Sometimes beautifully lithographed pictures are furnished by the manufacturers of window displays. This dealer was in the possession of one advertising automobile lights which showed a coast scene with a lighthouse, and an automobile travelling along a dark highway.

The ingenious window decorator conceived the idea of cutting out the representation of the lens and lighthouse rays, and passing some translucent white paper behind the parts that had been thus eliminated. Then he made the lithograph the front of a box arrangement in which he inserted an ordinary incandescent lamp. The result was that when illuminated at night it made an unusually forceful and attractive window feature.

Depend upon the electrical dealer to see the possibilities of linking up electricity with his show window displays. In this case electricity and lithography combined to make an improvised but none the less effective selling help.

At the same time a selling help was offered to the manufacturer.

A PATRIOTIC POSTER designed for American workers, be they miners or electrical men, has been gotten out by Edwin Higgins, consulting engineer for the California Metal Producers' Association, for use in the mines and offices of the company. It is in response to no special call, but with the idea that Americans need only be reminded of what is developing about them, to answer in all patriotism.

"I am a voice, seeking lodgment in the conscience of every true American, a voice seeking to unfold before you the unmeasurable love and devotion that lies within the hearts of the men who will fight for this land and ours," the poster begins and goes on to urge loyalty of thought and action and response to the many minor calls on the individual. In view of the desire of every loyal citizen to do his part and to utilize the channels of his business organization to assist the nation wherever possible, this contribution from a private organization is of particular interest.

TO THE MEN OF THE MINES!
Support the Red Cross, Y.M.C.A. and Kindred Organizations—
Stop the Waste of Foodstuffs—
Buy Thrift Stamps—
Cut Out Wasteful Spending—
Combat Unpatriotic and Treasonable Utterances—
Invest Your Money in Liberty Bonds—
Give Freely of Your Time for Patriotic Endeavor—
Keep the Wheels of Industry Turning—

THE PROOF OF THE PUDDING is in the eating, according to the old adage and the same may be said of electrically made toast.

A jobber in electrical appliances in one of the largest cities in the country keeps track of meetings of women's societies and clubs and where it is practicable, that is, not too costly, he asks permission to serve coffee and toast or other light refreshments that can be prepared electrically at these functions.

In a large number of cases he receives permission to do this, and is permitted further to talk on electrical cooking. This lecture, accompanied by practical demonstration, not only does a great deal to educate the women to the idea of cooking by electricity but has resulted in a large number of quick sales.

HANDBILLS are considered a nuisance by many householders, for the reason that they blow about and deface the lawn or front steps, or even the front hall of a residence and necessitate stooping and picking them up from perhaps some very inconvenient place. After the lady of the house has been forced to stoop down and remove a handbill from the dusty sidewalk—perhaps with her white gloves on—she does not feel kindly toward its originator and looks only for the nearest waste basket in which to drop it. In very few cases does the handbill get beyond the first person who enters or leaves the house after its insertion. In nine cases out of ten this is the servant or some non-purchasing member of the family who merely destroys the bill and says nothing further about it.

For this reason the suggested scheme of attaching such handbills to sharpened sticks in the form of a gay colored pennant and having these stuck into the front lawn or dooryard by the delivery boys, is a great improvement on the usual scheme. If there is a local demonstration or neighborhood sale which may be advertised in no other way than by handbills, pennants of this type will awaken far less resentment and receive more general attention owing to their originality.

LEARNING FROM EXPERIENCE is perhaps the most effective way of obtaining knowledge, but it is a less expensive method if it is possible to learn from some one else's experience. An experience of the retailing counsel of the Associated Advertising Clubs of the world in regard to shoes, might well be applied to electrical retailing and a lesson learned free of charge.

On his first visit, he found the little Western town had seven shoe stores.

This interested him so much that he made an investigation of the local shoe situation and discovered, among other things, that the cashier of the local bank and one or two other prominent men drove over to a town not much larger, twenty miles away, to buy their shoes.

The reason was apparent.

So many different dealers were attempting to handle shoes that not one of them carried a comprehensive stock, and none had shoes to suit the banker.

He showed, during the course of his Merchants' Institute in this town, that there was enough money invested in shoes in that town to provide sizes and styles for a community twice as large, yet local men and women were forced to go elsewhere to get satisfactory shoe service.

The trouble was over-lapping lines. Too many merchants carried incomplete lines that lost money for themselves, their competitors and the manufacturer who sold them the shoes.

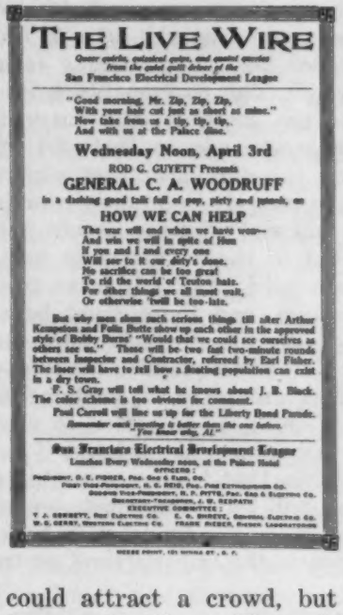
Nobody was pushing the shoe business. In the long run, this meant that the community was buying fewer shoes, all told, than it might have bought had enterprising merchants been introducing new styles and attractive shoes in a modern way.

His talk, as he found in the community on the second visit, bore fruit. The number of shoe lines had been reduced and the amount of sales increased. Customers were better satisfied, the merchants made more money and manufacturers, of course, supplied the increased demand.

At first blush, it seems that the manufacturers should not care whether shoes were sold in this town or the neighboring towns. But as a matter of fact, the people were buying fewer shoes than they should. They were wearing shabby shoes because the limited displays were not tempting, and they used their money for other things.

The moral hardly needs pointing.

THE LIVE WIRE is something which is bright and sparking, doing business—a thing which you can't pick up and forget, but which gets under your skin, somehow, and puts you into action. For that reason these bright little announcement cards which are gotten out weekly by the San Francisco Electrical Development League are particularly well named. An attractive invitation is half the success of a meeting. Of course you may have established such a reputation for worth while programs that a mere calendar date will bring your company—or you may furnish such poor programs that no invitation could attract a crowd, but usually the successful two go together. The spirit of good comradeship and the snappy life of meetings is a thing which is obviously read through the invitation card. The ideal card has something of dignity — for a mere circus vaudeville stunt repeated often will lose you some of your best members—and at the same time something of informality to suggest the co-operative good feeling of the gathering. It suggests something you can't afford to miss, either by way of serious information or pleasant acquaintance.


THE LIVE WIRE

Quaint quirks, colonial color, and quaint quotes from the quiet quill driver of the San Francisco Electrical Development League

"Good morning, Mr. Zip, Zip, Zip,
With your hair cut just as short as mine."
How take from us a flip, flip, flip,
And with us at the Palace dine.

Wednesday Noon, April 3rd

ROD G. GUYETT Presents

GENERAL C. A. WOODRUFF

in a dashing good talk full of pep, piety and pinch, on

HOW WE CAN HELP

The war will end when we have won—
And win we will in spite of Him
If you and I and every one
Will see to it our duty's done.
No sacrifice can be too great
To rid the world of Teuton hate.
For other things we all must wait,
Or otherwise 'twill be too-late.

But why men claim such serious things till after Arthur Koepsten and Felix Butte show up each other in the approved style of Bobby Burns' "Would that we could see ourselves as others see us." There will be two fast two-minute rounds between Inspector and Contractor, refereed by Earl Fisher. The loser will have to tell how a floating population can exist in a dry town.

F. S. Gray will tell what he knows about J. B. Black. The color scheme is too obvious for comment.

Paul Carroll will line us up for the Liberty Bond Parade.

Remember each meeting is better than the one before.
"You know why, Al."

San Francisco Electrical Development League

Luncheon Every Wednesday Noon, at the Palace Hotel

OFFICERS:

PRESIDENT, O. C. PIONCE, Pac. Gas & Elec. Co.
FIRST VICE-PRESIDENT, G. C. REID, Pac. Coast Exterminator Co.
SECOND VICE-PRESIDENT, R. P. BUTTE, Pac. Gas & Electric Co.
SECRETARY-TREASURER, J. W. REDPATH

EXECUTIVE COMMITTEE

T. A. GERBETTE, Pac. Electric Co. C. C. BYRNES, General Electric Co.
W. G. GERRY, Western Electric Co. FRANK BIERER, Bierer Laboratories

BIERER PRINT, 121 MINNA ST., S. F.

His talk, as he found in the community on the second visit, bore fruit. The number of shoe lines had been reduced and the amount of sales increased. Customers were better satisfied, the merchants made more money and manufacturers, of course, supplied the increased demand.

At first blush, it seems that the manufacturers should not care whether shoes were sold in this town or the neighboring towns. But as a matter of fact, the people were buying fewer shoes than they should. They were wearing shabby shoes because the limited displays were not tempting, and they used their money for other things.

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Back of the invitation, of course, must come the meeting itself. If your organization is a worth while gathering of worth while people it will have a serious purpose somewhere—a purpose that cannot be consistently neglected. Time and again the principle has been proved that it is the serious things rather than the good times which alone can hold a group of any size together. On the other hand, no group can work successfully who are not friends—and part of the serious purpose of every electrical organization should be to enjoy itself together, to foster good feeling and promote acquaintance. Half the battle for co-operation is won when both sides know each other.

COURTEOUS ATTENTION TO TRAVELING SALESMEN

BY W. R. HERSTEIN

(The traditional thing to do with an advertisement which comes through the mails is to throw it into the waste basket—with a traveling salesman to evade him. But both are a convenience provided by the manufacturer to bring the market to your doors—and both deserve the consideration you are asking for your wares from another public. The author is manager of the Electric Supply Co. of Memphis, Tenn., and well known as an authority in business fields.—The Editor.)

This paper might better be addressed to a gathering of traveling salesmen than to a convention of public utilities or retail dealers, inasmuch as the reception accorded a salesman by a prospective buyer depends to the extent of about ninety per cent upon the personality of the former and only about ten per cent upon the latter. It is safe to say that a large majority of the human race are courteous by nature, and a salesman may properly take it for granted that the customer he is approaching is a member of this majority. This circumstance immediately imposes upon the salesman the duty of capitalizing this favorable attitude on the part of the purchaser, by giving the purchaser that which he is entitled to in return, namely, a proposal worth listening to; one which will make for the benefit not only of the salesman, but of the customer as well. Selling goods is not a one-sided affair. It takes two to complete the transaction, and there must be a sufficiency of advantage accruing to both sides, in order to make it successful. Consequently, the salesman is taking an unfair advantage of the customer's friendly attitude, and is doing an injustice to any of his successors who may happen along later, if he does not feel, in good faith, that he has something to offer which, if bought, will leave the purchaser in a better condition than before the transaction took place. To deliberately waste the buyer's time, or to impose upon him an article worth less than the price accepted, is morally wrong and impolitic; it insures an uncordial reception or an absolute refusal of audience thereafter, to the salesman involved, and reacts unfavorably upon the entire body of traveling men so far as that particular customer is concerned.

Assuming, however, that the salesman has qualified himself so as to become entitled to the respectful and courteous attention to the buyer, are there any corresponding obligations resting upon the buyer which should impel him to give the salesman a hearing?

As a Matter of Self Interest

Rightly or wrongly, self-interest is is one of the most powerful motives operating upon the human mind. From this standpoint alone, it is well to accord the hearing requested. Many of us have not the opportunity of visiting throughout the year, the various trade and manufacturing centers, and to a large extent, we depend upon these missionaries of commerce to keep us abreast of the times. Even were it otherwise, their thoughtfulness introduces us to many an article we might have overlooked, and brings us to a mass of new ideas they have gathered up while making the rounds of their territory. Their competitive prices enable us to secure goods at proper market values, and at the same time make it possible for us to guard against spurious, counterfeit or shoddy products offered at prices which, by comparison, arouse our suspicions. In no manner can the interests of the purchasing end of a business be more perfectly safeguarded than by availing one's self of the advantages offered by the conscientious, reliable traveling salesman.

A New Idea

From the purely ethical standpoint, the subject may be viewed in this manner; nearly all of us have something to sell, in addition to having something

FLOODLIGHTING IN UTAH

A most beautiful example of what may be done by floodlighting is illustrated in the Latter Day Saints' Temple of Salt Lake City. The effect is produced by seven G. E. type "L 1" floodlighting projectors located on top of the Utah Hotel across the street. The installation was made by Eardley Brothers Company, electrical contractors and dealers of Salt Lake City.

to buy. When we step into the seller's shoes, we must present our wares either in person or by means of salesmen. If our wares are to be sold, we must receive the courteous attention of those to whom we or our salemen present them. Somewhere, I remember reading a bit of advice which has always struck me as being exceedingly sound, and which runs something like this: "Whatsoever ye would that men should do unto you, do ye even so unto them." And then again, I remember another statement which has apparently stood the test of time and which proclaims that "Whatsoever a man shall sow, that shall he also reap." How, then can we reasonably demand of the public an opportunity to present our own case, if we refuse to grant a like opportunity to the other man? How many times has every man in this audience listened patiently even to an uninteresting salesman, for the sake of his own solicitors who might possibly at that very moment be in a similar situation far away?

Personally Speaking

And then, there comes the thought that possibly the salesman who cannot command this sort of welcome seldom lasts long in one territory. If he represents a reputable house, conducts himself properly in private life, and acts squarely with his trade, it is not long before he becomes a potential factor in the community. Knocking about the world, as he does, he acquires a cosmopolitan manner and a knowledge of life and of men which make him an agreeable companion. Properly handled, his good will may easily become valuable, and it is almost axiomatic that a purchasing agent who has incurred the ill will and distrust of the travelling fraternity can not secure best results for his employer.

WIRING DATA FOR A.C. MOTORS

Helpful data in regard to wiring and protection for A.C. motors as worked out by C. U. Mitchell, electrical engineer of the Board of Fire Underwriters, is given as follows:

THREE-PHASE, 220 VOLT, ALL FREQUENCIES

Horse-power	Size of Wire Rubber Insul. B. & S. Gage	Starting Protection Capacity Amperes	Running Protection Capacity Amperes	Size of Control Switch Amperes
½	14	5	5	30
1	14	10	5	30
2	12	20	10	30
3	10	30	15	30
5	8	40	20	30
7½	6	60	30	Where a Disconnecting Switch is installed it should have a capacity rating not less than the figure given under either Starting or Running Protection, depending upon the leads in which it is placed or the device (Compensator, fuse, etc.) which it is to disconnect.
10	6	70	35	
15	4	85	50	
20	2	110	65	
25	1	140	75	
30	0	160	90	
35	0	180	110	
40	00	190	120	
50	000	200	145	
60	200,000	250	170	
75	300,000	300	210	
100	400,000	400	275	

Note.—Where running protection is provided by means of overload release devices the setting of these should correspond to the figures given in the table. Where fuses are installed for running protection and it is found that none are made to correspond to figure in the table, provide trade size having capacity nearest to but greater than figure in table.

Co-operative Campaign Problems

BY A. L. SPRING

FOLLOWING UP PROSPECTS

Contractor-dealers are continually receiving prospects referred to them by central stations. While it is true all of these prospects cannot be closed, a large percentage of them can, and everyone should be carefully followed. The number of sales to be made to these prospects is dependent upon the promptness and care in properly following them. Whenever a dealer receives a prospect, not only should he show his appreciation to the central station, but should definitely advise them what action is being taken on it. There is no doubt but that the dealer who reports back to the central station is the one who will continue to have prospects referred to him.

A few days ago I called on a dealer in a small town in Southern California, and during the conversation asked him how the co-operation was with the central station. He replied that it was excellent, that he had no complaint whatever to make and in fact claimed the co-operation had improved materially since the start of the Co-operative Campaign. He also said that the central station district agent had referred three good prospects to him that day. I then asked him if he was sure that he was doing his part in this co-operation which he was so anxious to have continued, and if he was giving these prospects his best possible service. He said that he certainly was, and yet within a few minutes from that time, the central station agent dropped in to see if he had looked after one of the prospects which should have been attended to before that time. It was found that through careless oversight on the part of the dealer the prospect had been neglected. If the agent had not kept this prospect in mind for the dealer, the customer would not have received the proper attention, would have been provoked at the central station, and the dealer would have lost the order. The dealer immediately prepared to call on this customer, and in order to get him there as quickly as possible and also to see what might be the result of this prospect, I took him, and in a very few minutes an order of about one hundred and twenty-five dollars was secured, which order would have been lost if the dealer had not been followed by the central station.

Mr. Contractor-Dealer,—the prospects referred to you by the central station must have your most prompt and careful attention, or you will not continue to receive them. The central station in referring prospects to you, in each instance, places their reputation for service in your hands, and it is of vital importance to them, to you and the industry as a whole, that these prospects be attended to very carefully. With your best possible attention given to them and a report to the central station of your actions in each case, they will continue to come to you in increasing numbers.

EXAMINATION FOR SUPERVISING ELECTRICIANS, PORTLAND, OREGON

(Stricter requirements in the inspection and approval of electrical installations are being instituted everywhere. The law requiring examination of all electricians supervising any electrical work has recently been put into force in Portland. A sample of the examination required and the results of the test of last month given below will be of interest to contractors throughout the West.—The Editor.)

The Electrical Code of the City of Portland, Oregon, provides for the examination and registration of supervising electricians. Electrical permits and the examination necessary for the supervising electricians to pass, before being registered by the city as such, are given as follows:

REGISTRATION OF APPLICANT FOR ELECTRICAL PERMITS

Section 8. (a) Any person desiring a permit to perform electrical work under this code in or on any building in the city of Portland shall file with the Bureau of Buildings an affidavit setting forth that all work to be done under any permit issued to him during the period of his registration will be performed under the direct supervision or control of a person registered as a Supervising Electrician in accordance with the provisions of Section 9 hereof. Upon the filing of such an affidavit and the payment to the City Treasurer of the sum of twenty-five ($25.00) dollars as an annual registration fee, the Bureau of Buildings shall issue to the applicant a certificate of registration which shall entitle him ot sign applications for electrical permits as hereinafter specified. The name of the applicant and his authorized signature, his place of business, residence and telephone number, if any, shall be filed with the Bureau of Buildings.

REGISTRATION OF SUPERVISING ELECTRICIAN

Section 9. Every person desiring to register as a Supervising Electrician shall file with the Bureau of Buildings an application for registration and an affidavit setting forth that the applicant is not less than twenty-one (21) years of age and has had not less than four (4) years' practical experience in the installation, alteration, repair and maintenance of electrical equipment, wires and apparatus for light, heat or power. In addition the affidavit shall contain the statements of two responsible persons, who have had at least four years' practical experience in the installation, alteration and repair of electrical equipment for light, heat or power, and who are at present actively engaged in electrical installation business, to the effect that they know the applicant has had the four years' experience as required, and that they believe him to be qualified to perform such electrical work as is controlled by this code. Upon approval of the affidavit by the Bureau of Buildings, the applicant shall receive therefrom a certificate or registration empowering him to countersign applications for electrical permits and to perform or direct electrical work authorized by such permits for the current calendar year.

On and after the first day of December, 1917, all persons applying for registration as Supervising Electricians shall submit to an examination as to their qualifications before the Board of Examiners touching their fitness and qualifications on the installation of electric wiring and apparatus for electric light, heat or power, and shall be required to receive an average of seventy (70) per cent on such examinations. Anyone failing to receive the required seventy (70) per cent at any examination shall be prohibited from appearing before the Board of Examiners for re-examination until a period of six months has elapsed subsequent to such failure to pass. The certificate of registration shall automatically expire on the 31st day of December of the year in which the same was issued. The certificate of registration may be revoked by the Bureau of Buildings if at any time the affidavit filed is shown to be false, or if the person registered as a Supervising Electrician refuse or neglect to comply with any of the provisions of this ordinance. If such certificate of registration has been revoked, no renewal of the certificate shall be allowed for a period of six months thereafter.

This Electrical Code also provides for an Electrical Board of Examiners, consisting of three members appointed by the Mayor. This board must meet quarterly for the purpose of holding examinations, to ascertain the qualifications and fitness of applicants for registration as supervising electricians. The candidate must obtain at least a grade of 70% to pass.

The first regular quarterly meeting and examination of the board was held May 18, 1918. The examination was divided into three parts, as follows:

Problems.—9:00 a.m. to 10 a.m.; twenty points. Examination written, any books or notes allowed to be used in solving the problem.

Questions on the Electrical Code of the city of Portland, Oregon.—Examination written, 1:00 a.m. to 12:00 m. Forty points. No books or aids allowed to be used.

Practical Work.—Actually carried out with tools and materials, at the Benson Polytechnical School, 1:30 p.m. to 5:00 p.m. Forty points.

Three applicants tried this test but none attained a grade of 70%.

The examining board is as follows: W. H. Pickering, E. W. Pierce, Chairman, F. D. Weber, Secretary.

PROBLEMS

(1) What size of rubber covered wire must be used for a three-wire main 110-220 volts, single phase or Edison D.C. system, to conform to the requirements of the Electrical Code of the City of Portland with an allowable drop of 3 volts and the distance to the load center is 40 feet? The circuit is loaded with two groups of 60 amperes of 110 volt lamps, each group connected between the neutral and the outside wires and balanced against each other. Also one group of 220 volt motors taking 20 amperes connected across the outside wires. No overload values to be considered for either lamps or motors.

(2)—

(a) What size of rubber covered wire in conduit should be used to conform to the requirements of Electrical Code of the City of Portland, with an allowable drop to the farthest lamp of 1 volt. Load consists of 12 incandescent lamps each taking ½ ampere. Distance from starting point of circuit to load center is 45 feet. Direct current 2-wire or single phase 2-wire system of distribution being used.

(b) Same problem except distance is 200 feet.

(c) Same problem except load is changed to 200 incandescent lamps and 5 volts drop.

QUESTIONS—ELECTRICAL CODE — CITY OF PORTLAND, OREGON

(1) Draw the symbols which have been adopted to indicate the following electrical equipments:

(a) Ceiling outlets.
(b) Bracket outlets.
(c) Wall receptacle outlets.
(d) Floor outlets.
(e) Drop cord outlets.

(2)—

(a) What size of wire B. & S. gage rubber covered must be furnished to supply 12 3-wire branch circuits 660

watts, capacity each, 110 volts.

(b) Same for 6 2-wire branch circuits.

(3) Describe in detail method of making a splice in rubber covered wire.

(4) What material only, is allowed for switchboard construction.

(5) What material only, is allowed for cabinets where the whole system is approved iron conduit.

(6) Describe in detail the standard methods of mounting a Resistance Device.

(7) Under what conditions and how can a transformer be installed inside a building entirely occupied by wholesale grocery company.

(8) Give the standard separation of wires in "Knob" and "Tube" construction for 110-220 volts.

(a) Between the ceiling and floor of a wooden joisted building.

(b) To what extent is this distance cut down by placing a continuous piece of approved flexible tubing on each wire.

(9) State the Code requirements:

(a) For service wires for all buildings.

(b) For all knife switches and cutouts.

(c) State whether a two or three wire service must be installed for all lighting services of 6 circuits or less, and all heating services of 15 amperes capacity or less.

(d) When determining the size of service mains, each circuit on same, must be considered carrying what percentage of full load.

(10) What is the minimum thickness in U. S. metal gage allowable for an iron cabinet.

PRACTICAL PORTION OF THE EXAMINATION

1. Splices in Conductors:
   (a) In solid No. 4 B. & S. gage rubber covered wire.
   (b) In stranded No. 4 B. & S. gage rubber covered wire.
2. Bending Rigid Conduit:
   (a) Right angle bend in ½-inch conduit.
   (b) 4-inch offset in ½-inch conduit 12 inches from end of conduit.
   (c) Bend and fit conduit to a surface in the Electrical Laboratories.
3. Cutting Rigid Iron Conduit:
   (a) Cut ½-inch conduit off and properly prepare for locking to outlet box.
4. Soldering lugs to strander No. 4 B. & S. gage rubber covered wire.
5. Wire portion of circuit, knob and tube concealed ready for a single set of 3-way switches and on 2 ceiling outlets.

MERCHANDISING ACCOUNTING SYSTEM

BY W. R. PUTNAM

(Only by analysis of the dollar of expense into its component elements of overhead, cost of goods sold, installation expenses and similar items can the electrical dealer know where he stands and what leaks should be stopped. The up-to-date practice of the merchandising department of the Utah Power & Light Company is explained below by the efficient salesmanager of that company in a discussion contributed to the Commercial Committee of the Pacific Coast Section, N. E. L. A., in connection with the paper on Retail Selling Practice presented at the recent convention.—The Editor.)

Effective March 1st, 1918, the Utah Power & Light Company installed a merchandise accounting system closely following the recommendation of the Accounting Committee of the N. E. L. A. on this subject, made at the 1917 convention of the National Electric Light Association.

The merchandise business of the Utah Power & Light Company has grown from $10,000 in 1912 to a total of $478,000 in 1917.

The combined costs for the months of March and April are as follows:—

ANALYSIS OF COSTS PER EVERY DOLLAR RECEIVED

Cost of goods sold	72.66c
Cost of installation	2.93c
Mdse. Salesmen's salaries, etc.	3.92c
Rental of stores	1.26c
General Expense	
Apport. Amount Exp.	1.50c
General Sales Dept. Exp.	.95c
Advertising and Demonstration	2.69c
Miscellaneous Exp.	1.59c
Insurance and Taxes	.95c
Uncollectable Accounts	.25c
Fixed Charges	
Interest on investment	2.89c
Interest on working capital	.78c
Depreciation and interest on fixtures	.01c
Net income	7.62c

Note.—The costs are given in cents, the sum total of the costs plus the net income equalling $1.00 of revenue received from merchandising sales.

The total sales for the two months amounted to $84,467.72.

FORM USED FOR INCOME AND EXPENSE STATEMENT

The officers of the Utah Power and Light Company felt that it was very desirable to install a merchandising accounting system for the purpose of determining definitely the actual amount of each item in merchandising costs. The accompanying form is one used for tabulating income and expense. It will repay careful study of the items listed as well as the form of arrangement.

INCOME AND EXPENSE STATEMENT
MERCHANDISE DEPARTMENT

Division _____ Date ending _____ 1918

	FOR MONTH		CUMULATIVE TO DATE	
	This year	Last year %	This year	Last year %
Revenue from Merchandise Sales				
Cost of merchandise				
Cost of merchandise				
Storeroom salaries & expenses				
Defective merchandise replaced				
Total Cost of goods sold				
Cost of installation				
Total cost of goods & installation				
Gross Profit				
Selling Expense				
Merchandise salesmen s salaries & Co				
Rental of stores				
Total selling expense				
Net Profit				
General Expense:				
App.Div.accounting expense				
App.general sales dept.expense. ($ per month)				
Advertising & Demonstrations				
Misclns.expenses				
Ins. & Taxes(1/6of1% of total stock)				
Uncollectible accts.(⅛ of 1% of total sales)				
Total general expense				
Net Earnings				
Fixed charges:				
Interest on investment (1/12of1% per month based on $ invest)				
Interest on working capital(1/12of1%per month based on $ deff.acct.				
Depreciation & Interest (10%)on store fixt.used for merchandising				
Total fixed charges				
Net Income or Loss				
Percent Net Income				
REMARKS:				

WHAT WESTERN INVENTORS ARE DOING

BY WM. K. WHITE AND H. G. PROST

(There are difficulties involved in foreigners obtaining patents in this country, as well as in Americans gaining protection for enterprises carried on abroad. The process is a more or less simple one where there are well established channels—but in China, for instance, there are no patent laws and consequently no patent attorneys. A most interesting and comprehensive discussion of this subject is here presented by the members of a prominent firm of patent attorneys of San Francisco.—The Editor.)

OBTAINING FOREIGN PATENTS

Persons residing in foreign countries, and particularly those residing in China, are greatly handicapped in applying for and obtaining patents in the United States. The Rules of Practice of the United States Patent Office require that the application be signed and sworn to by the inventor and provide that no change shall be made in the application after it is signed and before it is filed. These rules present no difficulty to persons residing in the United States, because many competent patent attorneys are available who can properly and completely describe and claim the invention and present the application in the form required by the Patent Office. A patent application is an extremely technical document and a patent claim has been characterized as the most difficult legal document to draw, so that it is apparent that a foreign attorney, struggling with translation and being encumbered by the knowledge of patent procedure in his own country, which is materially different from that in the United States, can not ordinarily prepare an application which will be acceptable to the United States Patent Office.

All foreign patent attorneys have correspondents or associate attorneys in this country, to whom they forward their applications for filing and prosecution, but since the application must not be altered after it is signed, the associate attorney files it as he receives it, even though it contains many apparent irregularities. Many of these may be subsequently corrected by amendment, but it often occurs, that some vital point has been omitted and no new matter may be inserted in an application after it has been filed. Fortunately, however, the Examiners in the United States Patent Office appreciate the difficulties of the foreign inventor in filing an application in this country and offer every assistance possible to the resident attorney, to permit him to correct the irregularities in the application.

Residents of China, however, are not as fortunate in this regard as residents of other countries, because China has no patent laws and consequently no patent attorneys to assist in preparing the application. The result of this has been that in the last six years, only sixteen patents have been issued in this country to residents of China. The resident of China, therefore, must either prepare his own application, a very hazardous proceeding at best, or he must submit his invention to an attorney in some other country to have the application prepared. The great length of time required for mail to travel back and forth between this country and China would probably deter the inventor from employing a patent attorney in this country to prepare his application, but nevertheless we believe that it would be the wiser action for him to take, taking full consideration of the delay in filing the application, due to the fact that after being prepared in this country, the application must be sent to China for signature and execution by the inventor and must then be returned to this country for filing. When the invention apparently possesses great value, it is of greater importance that the application be properly prepared than that it be filed quickly in the patent office.

The selection of an attorney in this country presents difficulty, since unfortunately many patent attorneys are not competent, or worse still, are unscrupulous. In a paper read before the Examining Board of the United States Patent Office, Mr. F. W. H. Clay, Assistant Commissioner of Patents, made the following statements:

"As a class inventors are among the most gullible of men. An inventive genius is quite generally an enthusiast, and it is the disposition of an enthusiast to believe all things. Inventors are not found exclusively among those actually employed in the great manufacturing industries, nor in the great centers of population, where men are surrounded by keen witted lawyers and business men. Many of them are in far outlying country places and in obscure positions where they have no opportunity to obtain reliable legal advisers. These men see in the papers plausibly worded advertisements of patent attorneys and obtain from them laudatory circulars, apparently showing that the attorneys are highly recommended, and they forthwith trust their money and welfare to men they have never seen. Just because they are a peculiarly easy prey to the unscrupulous attorney a patent attorney ought to be, even more than a general practitioner, a man of integrity and fair dealing.

The present evils are glaringly apparent. Make-believe inventions used for promoting stock selling schemes are usually carried on by the aid of unscrupulous patent attorneys. These should be vigorously searched out and eliminated. Great numbers of incompetents who have prostituted a profession into a mere business of fleecing the innocent, swarm about the Patent Office offering alluring prospects to useless ingenuity. When they catch the innocent they file imperfect papers; they prosecute with the sole view of getting a patent quickly without regard to its value; they habitually induce inventors to file expensive foreign applications before investigation as to whether there is an investigation present.

They encourage efforts in wrong directions, promote the patenting of immature ideas, waste the money and energy of inventors, all for the sole purpose of swelling their own profits."

Unfortunately there is no way for the inventor in a foreign country to separate the wheat from the chaff and he is compelled to take chances and trust that the attorney of his selection possesses ability and integrity.

Applicants for patents in countries foreign to the United States are not faced by the difficulties encountered in filing applications in this country. In the majority of foreign countries, the signature of the inventor is required only on a power of attorney, so that the foreign attorney is at liberty to change the form of the specification and claims, as much as he believes to be desirable. The forms of specifications and particularly of claims, vary to a great extent in the different foreign countries, and claims which are acceptable in form in one country are objectionable in others. The resident foreign attorney being familiar with the practice in his own country and being at liberty to alter the specification and claims as much as he desires, will rewrite these parts of the application so that they are acceptable to the Patent Office in his country. It is customary for the United States attorney to forward to the foreign attorney, a copy of the application as filed in this country and permit the foreign attorney to use his own judgment in selecting the important features of the invention and revising the application accordingly. While this is the line of least resistance for the United States attorney to follow, we believe that it is not the proper course to pursue, because it is frequently very difficult to pick out the actual invention from claims as drawn in this country. An attorney here, is or should be, familiar to some extent with the form of claims used in the various foreign countries, and in order to serve the best interests of his client, he should draw the claims in the foreign form to the best of his ability. These claims may not be in exactly the proper form, but they will greatly assist the foreign attorney in analyzing the invention, with the result that he will be able to prepare a proper application. It is also advisable to instruct the foreign attorney as to the main features of the invention so that he will have a clear understanding of the scope of the invention before proceeding to redraft the claims.

We have stated heretofore, that no patent law exists in China and this operates greatly to the disadvantage of China and is one of the causes which has prevented her from becoming a manufacturing country. China offers an extremely rich field for the exploitation of new devices and inventions, but due to the fact that protection for inventions cannot be had, there is no inducement for manufacturers to enter that field. We know of many instances where inventors were extremely anxious to patent their ideas in China and were prepared to follow up their patents with exploitation and manufacture, but the inability to obtain patent protection has dissuaded them from entering that market.

Protection to a limited degree may be had in China against the appropriation of an invention by Chinese, but there is no manner in which protection against foreign residents may be had. This limited protection may be had by filing, at the office of the Consul-General of the United States, at Shanghai, an application for registration of a specification and drawings covering that invention. This consular registration often leads to more than the ordinary extra-territorial confusion. In practically every case, a foreign infringer demands that the question be adjudicated under the laws and by the courts of his own country, which proceeding can not offer much relief to the United States patentee. When the owner of the patent and the infringer are of the same nationality there is no such difficulty, and when the infringer is a Chinese it is possible for the patentee to obtain protection of his rights.

While we are on this subject of foreign patents, we believe it advisable to mention some of the regulations which have been put into effect in this country with relation to foreign patent rights during the war, particularly with relation to enemy countries. Subsequent to the declaration of war by the United States, Congress passed the Trading with the Enemy Act, by which citizens of the United States were permitted to file applications for patents in enemy countries, to prosecute applications pending and to pay the taxes on patents owned by them in enemy countries. It was necessary to obtain a license from the Federal Trade Commission to forward each document or credit and a great mass of matter was sent to enemy countries in that manner.

As long as we continued to do business in that manner with enemy countries, it was an admission on our part and evidence to the enemy that as soon as the war was over, we would begin trading again with them as usual. However, as this country went deeper into the war and realized the utter ruthlessness of the enemy, it was decided to absolutely cut off all relations whatsoever; to prevent the payment of taxes on patents so that the patents would lapse, and to prevent the filing of applications. It means that this country is becoming more serious, that we appreciate the force of the economic boycott and that we are preparing to prevent the re-establishment of commercial relations with the enemy. He has shown himself to be an outlaw and he shall be outlawed forever. On April 11, 1918, the President issued a proclamation revoking the power to issue licenses to citizens to file or prosecute any patent, trade-mark or copyright application in an enemy country, or to pay any tax on any patent, trade-mark, print, label or copyright, so that now all patents in the enemy country which are owned by United States citizens will become lapsed, unless the enemy, in his anxiety to have commercial relations re-established after the war, will take some action to prevent these patents from becoming invalid.

SPARKS—Current Facts, Figures and Fancy

(Most persons familiar with our own deserts in looking at the vast area of China as it is spread out on the map, picture part of it as arid land and sparsely inhabited. The astonishing figures given here as to crowded land holdings point an opposite conclusion. Several new inventions and foreign practices are further featured in the following.—The Editor.)

Spain has joined the other nations in daylight saving and since the middle of April has been starting her day an hour earlier.

* * *

A report of volcanic sulphur falling in Portland recalls a similar mystery of several years ago which proved to be a shower of very heavy pollen which was carried miles by a strong wind.

* * *

Before the summer is over this new game of driving rivets in a ship promises to be as interesting and as carefully scored as baseball. A recent report gives the record to a Portland shipyard, but before the week is out even that record bids fair to be outdone.

* * *

A red danger signal is proposed for automobile searchlights. When making roadside repairs, leaving a garage or the like, a red cylinder is advanced by the pressure of a button to encircle the lamp and thus the parabolic rays are intercepted and turned from white to red.

* * *

Gas masks have joined the periscope in service "over here." Employees of a telephone company in Indiana are wearing them while working on an underground cable. Recently, while work was being carried on at that point, the men did not use masks and one of them was overcome. Since the gas masks have been put in use no further trouble has been experienced.

* * *

An enterprising telegraph company has published a booklet with 250 messages suitable for different occasions. For Christmas you can have a choice of 32 greetings; for Easter there is an assortment of 29, while for weddings the choice is limited to 21, but then one ought to be able to get along with that number. Christmas and Easter occur all at once, but your friends don't all get married on the same day.

* * *

Norway possesses an enormous amount of power in its waterfalls, which have so far been utilized only to a comparatively small extent for power and lighting purposes. After investigation, it has been found that there will be available 15,000,000 horsepower when the different water powers are developed, and it is the intention to centralize this power so that it may be transmitted to all parts of the country. The work will be commenced as soon as possible.

* * *

An electric iron equipped with a switch which opens automatically when the iron is not in use is the latest. A switch button is provided in the forward part of the handle, just where the thumb ordinarily rests. Under normal ironing conditions, the thumb presses against the switch button and keeps the iron in circuit; removing the thumb cuts it out of circuit. By means of this switch button the current may be cut in and cut out at will be the operator, merely by moving the thumb.

* * *

In Kwangtung one-sixth of an acre will support one person, and the proprietor of two acres of good land having a family of five, can live without work on the produce of his little property. The system of intense farming in China can better be understood by the comparative rule. If the arable land of the State of New York be considered at a comparative rate of production and consumption, as in China, it would support the present population of the United States.

* * *

Evaporation from the surface of Gatun Lake during March, 1918, was the highest that has been recorded since the filling of the lake. It was 8.475 inches, over an area of 165 square miles. The aggregate evaporated water amounted to 3,248,000,000 cu. ft. This is equivalent to 1,213 cubic feet for every second, day and night, in the month. Had the water which the sun drew off been available for power it could have produced as much electricity as the hydro-electric station, the net output for which in March was 4,681,000 kwh.

* * *

In the Annales des Postes, Telegraphes et Telephones, an account is given of an interesting form of telephone receiver which consists of a vessel furnished at its base with a membrane facing an electro-magnet, as in an ordinary receiver. But above this membrane is placed a hollow cone, the base of which contains a second membrane, parallel to and a few millimeters away from the first. The cone contains a second electro-magnet in series with the first one, both being traversed by the speaking current. As a result the hearing value is stated to be doubled as well as the crackling effects and resonance suppressed.

* * *

In order to prevent undue heating of lightning arresters at Gamboa, Panama Canal, connected to the 44,000 volt transmission line, the Electrical Division has covered the metal cases with two layers of quarter-inch asbestos and two layers of heavy muslin. The muslin is made watertight by coating with paint, and a light gray color is used. It has been found that the interior temperature at the middle of the day has been kept down by this arrangement and that it affords effective protection against the heat of the sun, thus making it unnecessary to erect over the tanks the shelters which are generally placed over such arresters in warm climates.

PERSONALS

John A. Britton, vice-president and general manager of the Pacific Gas and Electric Company, has during the last monthly period contributed service to the West in full keeping with the best traditions of his splendid activity of many years standing. Not only in private life has this service shown itself in his recent going to Tacoma, there to bid his youngest son, First Lieutenant Emmet Britton, a godspeed to France, but as chairman of the San Francisco Chapter of the American Red Cross, he has rendered distinguished service to the nation in the splendid results attained in the recent Red Cross drive in San Francisco, in which all branches of the electrical industry backed him to the limit. And finally his splendid exhibition of comradery and evident desire to be of every possible assistance in forwarding the California Electrical Co-operative Campaign, as brought out while toastmaster at the get-together dinner in San Francisco on Friday, June 7, 1918, in the presence of over four hundred men prominent in the industry from all sections of California, have endeared him in the hearts of his fellow workers in a manner beyond the expression of words.

Harry Holabird, of the Holabird Electric Company of Los Angeles, is making an eastern trip in the interest of his company.

Thomas F. Murphine has been appointed president of public utilities of the city of Seattle, Wash., to succeed A. L. Valentine.

J. L. Newell has been appointed electrical superintendent of the British Columbia Electric Railway Company, of Vancouver, B. C., to succeed W. H. Fraser, resigned.

W. H. Evans has been appointed electrical engineer of the Tidewater Southern Railway, with offices at Stockton, California.

R. C. Bridge, manager of the Pacific District for the Willard Storage Battery Company, was a recent visitor in San Francisco.

A. W. Leonard, president of the Puget Sound Traction Light & Power Company, Seattle, is making a business trip to the Stone & Webster offices in Boston.

B. Badrian has resigned from the Hurley Machine Company and enlisted in the U. S. Navy. He is now stationed at San Pedro and working hard to fit himself for an ensign's commission.

W. A. Hillebrand, formerly with the Pacific Gas and Electric Company, San Francisco district, is now on the engineering staff of the Federal Telegraph Company located at Palo Alto.

John B. Fisken, electrical engineer for The Washington Water Power Company at Spokane, appears on the newly elected Board of Directors of the American Institute of Electrical Engineers.

Capt. W. D. Peaslee, U. S. Engineer Reserve Corps, who has been stationed at Camp Lewis since giving up his consulting engineering work at Portland, Ore., is now on his way to France.

Edward A. Lynch, formerly with the Abbott Printing Company of San Francisco, succeeds Mr. Badrian as factory representative of the Hurley Machine Company in the San Francisco district.

Ed. F. Neal, for several years chief electrical inspector for the city of Seattle, has resigned his position and become assistant manager of the Standard Electric Company, 73 Horton street, Seattle.

A. E. Wishon, assistant manager of the San Joaquin Light and Power Company, attended the Get-Together Dinner of the California Electrical Co-operative Campaign held recently in San Francisco.

Hal Lauritzen, illumination specialist of the Pacific States Electric Company, San Francisco, visited the Portland and Seattle offices of the company recently, while paying a visit to the northwest district.

Forest Winfree, formerly auditor of the Richmond (Cal.) division of the Western States Gas & Electric Company, has been promoted to First Sergeant in the San Francisco Base Hospital Unit No. 47.

Paul V. Quick, western representative of Landers, Frary & Clark with headquarters in San Francisco, has returned from a two months' trip through the northwest where he reports the greatest season's business in the history of his company.

Arthur H. Halloran, assistant business manager of the Journal of Electricity, is at Atlantic City where he is attending the annual convention of the National Electric Light Association in the interests of the Pacific Coast Section, N. E. L. A., of which he is secretary.

Gilbert Duffy, formerly office manager in the engineering department of the Puget Sound Traction Light & Power Company of Seattle, Wash., has been appointed secretary to the manager, succeeding Mr. J. M. Wilmott, who has been appointed sales manager for the coal mines.

J. A. Vandegrift, western salesmanager for the National Lamp Works, has left for a four weeks' visit to Eastern points where he will attend the annual session of the National Electric Lamp Asosciation held at the now justly celebrated "Association Island" on the St. Lawrence river.

Daniel Gallick, formerly with the publishing staff of the Journal of Electricity, was one of those in the 319th Engineers on Sunday, June 9, who had the pleasure of helping to carry away the marching and singing honors of the day at the vast review in which Madam Schumann-Heink took part.

John Murphy, electrical engineer, Department of Railways and Canals of Canada, has been appointed the duly authorized agent of the Fuel Controller for Canada to promote the substitution of hydro-electric power for steam power, having in mind the conservation of coal. Mr. Murphy has served a long apprenticeship in the telephone, and the electric light, power and railway field, which experience is proving of great value to the various federal controllers, commissions and departments with which he is now associated.

S. M. Kennedy, general agent of the Southern California Edison Company, journeyed all the way from Los Angeles to attend the get-together dinner at San Francisco on June 7, 1918. Mr. Kennedy has long been recognized as a national figure in central station commercial practice and his sincere relating of the good that has already been accomplished in Southern California combined with his evident conviction of the future success of the California Electrical Co-operative Campaign, caused his listeners to give weighty consideration to the message of helpfulness he brought from the South.

E. R. Davis, general superintendent of the northern division of the Southern California Edison Company, has been elected first vice-president of the Pacific Coast Section N. E. L. A. For years Mr. Davis' effective work with the Pacific Light & Power Corporation before its merging with the Southern California Edison Co. placed his activity among the leaders of the Southwest. His new responsibility marks him as the sole representative of the Southern California Edison Company upon the new managerial board of the Pacific Coast Section N. E. L. A. The splendid utility ideals of the company he represents have called forth favorable comment in the technical press the country over. Much is expected of Mr. Davis during the coming year and it is confidently believed he will make good in helping to solve the weighty problems now before the electrical industry in the West.

Romaine W. Myers, consulting electrical and illuminating engineer, with headquarters at Oakland, California, has been appointed on the divisional committee on lighting of the National Council of Defense. Adequate and satisfactory lighting in all plants doing government contract work is within the province of this committee.

C. S. MacCalla has resigned as vice-president and general manager of the Washington Water Power Company, of Spokane, Wash. He had been with the company for 16 years, previous to which time he was with an Australian railway for the General Electric Company and later with the Brooklyn Edison Company, of New York.

William T. Price has been appointed traffic manager of the Denver Tramway Company and the Denver & Intermountain Railroad Company, of Denver, Colo. Up to now he has been commercial agent for the Union Pacific system in charge of southern Colorado, which he handled from Pueblo.

John B. Miller, chairman of the Pacific division of the Red Cross, was guest of honor at a luncheon given him at the Bohemian Club by the managers of the San Francisco division. Mr. Miller dovoted much of his time during the drive to San Francisco and materially helped that city go over the top.

Captain W. J. Conway, of Vancouver, B. C., has been appointed secretary of the British Columbia Association of Electrical Contractors and Dealers to fill the position formerly occupied by R. B. W. Pirie. Captain Conway is considered one of the livest wires in British Columbia and it is expected the association will forge ahead under his able leadership.

R. T. Stafford, manager in the northwest for Allis-Chalmers Manufacturing Company with headquarters at Seattle, returned recently from a trip to California. While away he attended the Pacific Coast Electrical Jobbers convention and convention of the National Electric Light Association held at Del Monte, California, May 8th to 11th inclusive.

C. A. Lee, of the engineering department of the British Columbia Electric Railway Company, of Vancouver, B. C., recently resigned to enter the U. S. Navy as lieutenant in the civil engineers corps. Mr. Lee entered the employ of the company in 1909, and was in charge of the hydro-electric developments at Lake Coquitlam in 1911 and at Jordan River from 1912 to 1915.

F. W. Gay, general manager of the Atlantic department of the Pelton Water Wheel Company with headquarters in New York City, is greeting again many of his former engineering associates in San Francisco, where he is a recent visitor. It will be recalled that Mr. Gay was for some years the able representative of J. G. White & Company in this section.

Jerome W. Landfield, of San Francisco and a noted lecturer on Siberian and Russian matters and widely known in engineering and commercial matters on the Pacific Coast in their relation to the Orient, has gone to Washington, D. C., prior to his departure to Siberia where he goes on a special mission for the United States government.

Dwight W. Jones, youngest son of E. C. Jones, chief gas engineer for the Pacific Gas and Electric Company, has received his commission as second lieutenant in the Field Artillery and is assigned to Company C of the 115th Ammunition Train, situated at Camp Kearny, California. Mr. Jones entered the Third Officers' Training School and graduated near the head of his class.

C. N. Cross, assistant professor of mechanical engineering at Stanford University, has assumed the duties of efficiency engineer for the Federal Fuel Administration in California. A detailed study will be made of the power plants of the state, especially the smaller units, and suggestions will will be made as to how power plant economy can be bettered and thus a saving of fuel oil realized.

Lars Jorgensen, consulting engineer, **J. C. Clark**, assistant professor of electrical engineering, Stanford University, **Clarence E. Rogers** of the Pacific Telephone & Telegraph Company, **L. S. Ready** of the California Railroad Commission and **Robert Sibley**, editor Journal of Electricity, constitute the newly elected executive committee of the San Francisco Section of the American Institute of Electrical Engineers.

Thomas A. O'Donnell, director of oil production, U. S. Fuel Administration, was the guest of honor and principal speaker at a recent fuel administration dinner given by the Chamber of Mines and Oil at the Sierra Madre Club. Before a representative and enthusiastic gathering of over 250 oil men, Mr. O'Donnell talked at length on the "Petroleum Situation and Our National Needs."

Frederick Haynes Newell, formerly director of the Reclamation Service, now head of the department of civil engineering in the University of Illinois, is the recipient of the Cullom Geographical medal awarded by the American Geographical Society of New York. This gold medal has been awarded from time to time to explorers, writers, and men of science who have contributed to the advancement of geographical knowledge.

IN MEMORIAM

Lieutenant Thomas A. Davidson, a well-known engineer of the Pacific Coast States and a former contributor to the columns of the Journal of Electricity on the water supply of Victoria, B. C., has died of his wounds in France. The following letter has been received at the University of California, written by his brother:

"Gentlemen:

"My brother, Second Lieutenant Thomas A. Davidson of the Royal Garrison Artillery, once expressed a wish to me that in the event of his death, word should be sent to your periodical. He obtained his bachelor's and master's degrees from the University of California and rowed in the crew for four years, being captain in the fourth year. He joined the Canadian forces in the spring of 1915, coming overseas in the Canadian Overseas Railway Construction Corps as a sapper. After service in France, he obtained his commission in the British artillery, being gazetted in March, 1917. He returned to the front in August and died of wounds at No. 54 Casualty Clearing Station on April 9th, 1918.

"Sincerely yours,

"LIEUT. G. C. DAVIDSON '08,

"15th Reserve Batt'n, Canadians."

"25 April, 1918."

MEETING NOTICES FOR ELECTRICAL MEN

(Annual meetings and election of officers mark the beginning of the vacation season. Several of the national societies are holding conventions in the June period and local meetings are largely of a special nature—but therefore, also, of special interest.—The Editor.)

THIRTY-FOURTH ANNUAL CONVENTION, A. I. E. E.

The thirty-fourth annual convention of the American Institute of Electrical Engineers will be held June 26-28, at the Marlborough-Blenheim Hotel, Atlantic City, N. J.

The convention will include six technical sessions, an informal reception and dance on the evening of the first day, and conferences of Institute officers and Section and Branch delegates at luncheon each day from 12:30 to 2:30 p.m. There has been no session assigned to Thursday afternoon in order that those present may avail themselves of the many attractions and entertainments which Atlantic City offers.

ANNUAL A. I. E. E. MEETINGS

The final meeting of the season for the Utah Section was held at the University Club, Salt Lake City, on the evening of May 28th. The event was celebrated by a dinner and a short business meeting.

The Spokane Section held its annual meeting on May 17th, with a program consisting of talks by Prof. M. K. Akers on "The Fundamental Mathematics of A.C. Circuits" and by Major P. T. Acland on "Recollections of Ypres Salient."

The annual meeting of the Denver Section was held at the Denver Athletic Club on May 18th. "Wireless Communication and Signaling on Sea and Land" was the subject matter of a paper by R. C. Mann, formerly of the U. S. Navy Submarine Service. Prof. O. C. Lester of the University of Colorado also gave an address on "The Phenomena of Eclipses of the Sun"—with particular reference to the eclipse of June 8th which was viewed in its total phase in Denver.

BUILDERS OF THE WEST — XXXI

CAPTAIN ROBERT DOLLAR

From the earliest historic times on down through the ages men who have sailed the seas and manned the ships that ply the commerce of the world have been recognized as builders of the first order. To Captain Robert Dollar, whose ships have become familiar and friendly visitors in all the great seaports of the Pacific, this issue of the Journal of Electricity is affectionately dedicated as a lasting memorial to his great work as a Builder of the West.

DRAINAGE CONFERENCE

A drainage field-meeting was held in Portland and vicinity June 4th. This meeting was arranged by the Oregon State Drainage Association in co-operation with the extension service of the college and the Oregon Development Bureau, and is the first annual field meeting of the association.

R. P. Teele, associate chief of drainage and irrigation investigations of the United States department of agriculture, and representative of the capital issues committee, was the principal speaker from outside the state.

PACIFIC COAST GAS ASSOCIATION

The second "Get Together" Dinner of the Pacific Coast Gas Association for the season of 1918 will be held at the Palace Hotel, San Francisco, on Saturday evening, June 15, at 6:30 p.m. Members are accorded the privilege of inviting guests.

SACRAMENTO ENGINEERS' CLUB

At a recent meeting of the Sacramento Engineers' Club, the members enjoyed a program given by Mr. O'Shaughnessy, City Engineer of San Francisco, on the present progress in the Hetch Hetchy work. The talk was beautifully illustrated with lantern slides. The meeting was held in the spacious auditorium of the High School, the business men being invited as guests of the club.

BRITISH COLUMBIA ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS

The B. C. Association of Electrical Contractors and Dealers held their regular monthly meeting at 406 Yorkshire Building, Vancouver, B. C., on the 4th instant.

There was a large attendance, the chair being taken by the president, Mr. C. H. E. Williams.

The business of the meeting consisted of the appointment of a secretary-treasurer, Captain W. J. Conway, 1575—12th Ave. W., B. C.; and the appointment of a special committee to make arrangements for the next (second) annual meeting, which is to be combined with a picnic to be held at Victoria, B. C., about the middle of August, when it is hoped that Mr. Elliot of San Francisco may be present to repeat his kindness of last year, by giving the association the benefit of his advice on matters electrical.

The president read his report on the California Convention and was tendered a vote of thanks for his excellent work and report.

Mr. Hayward was present as a delegate from the Victoria association.

ANNUAL MEETING, PORTLAND N. E. L. A. AND A. I. E. E.

One hundred and two members of the local Section of the A. I. E. E. and N. E. L. A. journeyed by auto to Mrs. Henderson's at Crown Point on the Columbia River Highway, Tuesday evening, June 4, 1918, where a chicken dinner awaited them.

During the dinner they were entertained by various musical numbers.

The meeting was called to order by Mr. E. D. Searing, president of the local Section A. I. E. E., after which it was turned over to Hon. J. A. Laing, General Counsel for the Pacific Power and Light Company, who presided for the balance of the evening.

The speaker of the evening was Prof. Stafford, head of the chemistry department of the University of Oregon. In an informal talk Prof. Stafford told of his research work in connection with the problem of making use of the waste wood of the northwest.

OFFICERS ELECTED

A. I. E. E.—R. M. Boykin, chairman; W. D. Scott, secretary; F. H. Murphy, A. S. Moody and E. D. Searing, executive committee.

N. E. L. A.—H. H. Schoolfield, chairman, R. F. Monges, vice-chairman; F. H. Murphy, secretary; A. N. Cudworth, treasurer; C. L. Warnicke, C. P. Osborne and C. R. Young, executive committee.

CALIFORNIA ELECTRICAL CO-OPERATIVE CAMPAIGN

(There was held in San Francisco on Friday evening, June 7, 1918, in the commercial club rooms a get-together dinner which proved so representative in its make-up and so sincere in its expression that it may well be termed one of the great gatherings of the year. The affair was held under the auspices of the advisory committee of the California Electrical Co-operative Campaign before an audience of over four hundred.—The Editor.)

In the issue of the Journal of Electricity for April 1, 1918, an account was given at some length concerning a similar gathering in Los Angeles, held on March 15. Since that time results have already been attained in Southern California which indicate that the formulators of this splendid spirit of co-operative helpfulness are working along the right lines.

The effect of such a movement as this will not be local. It will spread beyond the bounds of the nation and as commented upon in the leading editorial of this issue of the Journal of Electricity, this principle of respecting the ethics of the various branches of the industry when the one overlaps the other may well be applied to countless other perplexing world problems and may eventually pass over the seas and become a strong factor in maintaining the permanent peace of the world. For an institution founded upon the principles of right and justice can not be narrowed down to any locality or particular application.

The tables at the banquet were beautifully arranged and lively singing was indulged in throughout the evening. An attractive song book was given to each person in attendance which will long serve to keep alive the good times experienced. The following was the program in detail:

PROGRAM

JOHN A. BRITTON, Toastmaster—
Vice-President and General Manager Pacific Gas and Electric Company.

L. H. NEWBERT—
Chairman Advisory Committee, California Electrical Co-operative Campaign; Manager Commercial Department, Pacific Gas and Electric Company.

H. C. REID—
Pacific Fire Extinguisher Company; President California Association of Electrical Contractors and Dealers.

THE SAN FRANCISCO GET-TOGETHER DINNER OF THE CALIFORNIA ELECTRICAL CO-OPERATIVE CAMPAIGN

Here is a gathering of over four hundred in attendance, composed of men prominent in the electrical industry from many cities of California. The purpose of the assembly is to forward a spirit of mutual helpfulness and judging from the enthusiastic reports from all quarters the meeting may be classed as having proved highly successful in every sense of the word.

SAMUEL KAHN—
Vice-President and General Manager Western States Gas and Electric Company; President Pacific Coast Section of the National Electric Light Association.

FRANK R. DEVLIN—
Member Railroad Commission of the State of California.

A. B. C. DOHRMANN—
President Dohrmann Commercial Company and Nathan-Dohrmann Company.

S. M. KENNEDY—
General Agent Southern California Edison Company.

ALBERT H. ELLIOT—
Secretary Pacific Division Electrical Supply Jobbers' Association; Attorney California Association of Electrical Contractors and Dealers.
Songs by Frank Fowden and Lowell Redfield.
Community Singing.

The Advisory Committee at their meeting Saturday, June 8th, adopted the following policy with respect to the sale of current consuming devices by central stations and dealers:—

"It is the policy of the Advisory Committee not to ask or urge Central Stations to go out or to stay out of the business of selling lamps, appliances, etc., at retail to their regular consumers. It is, however, the policy to encourage the central stations to conduct their selling of appliances, etc., in a manner which shall conform to the business ethics of the retail merchants in whatever territory the central station conduct a retail merchandise business.

"It is also the policy of the Committee to help and encourage dealers to improve their business methods and so to serve the public in the retailing of lamps and appliances that a large volume of the business will naturally flow to them. This policy will be followed by the committee to the end that these two branches of the electrical industry may both profit to the greatest extent, and that the consumer may enjoy electrical service at the lowest cost consistent with the quality of the service."

The Committee also arranged to issue and distribute a monthly bulletin which would carry to the contractor-dealers and other contributors information about the progress and plans of the campaign.

The Committee accepted an invitation from the Executive Committee of the California Association of Electrical Contractors and Dealers to present the story and plan of the campaign at the evening meeting of the Contractor-Dealers' Association which is to be held in Oakland on July 27th.

A get-together dinner for the central district of California is to be held in Fresno early in August. The plan and work of the campaign will be told at this Fresno meeting as it has been at the Los Angeles and San Francisco meetings with the idea of enlisting all people engaged in the electrical industry to take an interest and a part in the campaign work.

ATTENDANCE AT CO-OPERATIVE CAMPAIGN DINNER

ENGINEERS AND MISCELLANEOUS ATTENDANCE

H. C. Reid, Pres. Cal. Ass'n of Elec. Cont. & Dealers
Albert Elliot, Sec'y Pac. Div. Elec. Supply Jobbers' Ass'n
Geo. E. Kimball, Industrial Accident Comm.
Robt. Stringham, Industrial Accident Comm.
W. M. Deming, General Manager, Journal of Electricity
Robert Sibley, Editor, Journal of Electricity
Rudolph W. Van Norden, Consulting Engineer
Romaine W. Myers, Consult. Elec. Engr.
Arthur H. Barendt
L. N. Robinson, Univ. of Cal.
Lloyd Henly, Railroad Comm.
B. D. Dexter, Railroad Comm.
Nathan A. Bowers, Pacific Coast Editor, Electrical World
Lowell Redfield, Redfield Music Studio, Oakland
George A. Cleary, Board of Fire Underwriters
Walter J. Dodge, Railroad Comm.
F. T. Vanatta, N. W. Pac. RR.
Jewett A. Baker, Sec'y Alameda Co. Fixture Ass'n
R. A. Rodeil, The Paraffine Company, Inc.
Rod. G. Guyett, Crocker Bldg.
J. W. Redpath, Sec'y Cal. Ass'n Elec. Cont. & Dealers
W. H. Brainerd, Field Representative Cal. Elec. Co-operative Campaign
N. E. Bittmann, Bittmann Battery
H. N. Nelson, Enterprise Elec. Wks.
J. M. W. Gerkyson, Supt. The Pac. Tel. & Tel. Co.

MANUFACTURERS & JOBBERS

Alexander & Lavenson Electric Supply Co.
David K. Johnson, S. F.
W. E. Andrews, S. F.
Marcel L. Hirsch, S. F.
George H. Ross, S. F.

Baker-Joslyn Company
C. G. A. Baker, S. F.
Harry Hartzell, S. F.

Hamilton & Pacific Company
George H. Sharp, S. F.
Curt. C. Davis, S. F.

Bethlehem Shipbuilding Corporation
Henry C. Vollers, S. F.
H. O. Hook, S. F.

California Electrical Supply Company
T. H. McDonnell, S. F.
J. Hepburn, S. F.

Crocker-Wheeler Company
W. K. Brown

Drendell Electric Mfg. Company
A. E. Drendell, S. F.

Dunham, Carrigan & Hayden Company
C. E. Wiggins, S. F.
H. S. Engle, S. F.
Eugene P. Schaefer, S. F.
A. J. Johnson, S. F.

Edison Electric Appliance Company
B. Y. Gibson, S. F.
W. J. Verdery, S. F.

Electric Railway & Mfrs. Supply Company
Harry C. Herning, S. F.
Geo. H. Curtiss, S. F.
Samuel H. Taylor, S. F.
Purcell Rowe, S. F.

Electric Appliance Company
H. D. Havey, S. F.
W. E. Shields, S. F.
J. H. Miller, S. F.
L. V. Carr, S. F.
J. P. Morgan, S. F.
Wm. Weston, S. F.
R. E. Salven, S. F.
Geo. R. Thomson, S. F.
H. F. Schultz, S. F.
H. Zweifel, S. F.
H. A. Cram, S. F.
F. J. Cram, Salesmanager, S. F.

Fairbanks, Morse & Company
V. E. Nittinger
J. W. Ferguson

Garland-Affolter Eng. Company
P. H. Affolter

General Electric Company
E. O. Shreve, Asst. Local Mgr., S.F.
R. M. Alvord, Local Mgr. Supply Dept., S. F.
W. J. Davis, Jr., Pac. Coast Engineer, S. F.
F. E. Boyd, Mgr. Small Motor Dept., S. F.
C. A. Loring, Chief Clerk, S. F.
R. E. Monell, Foreign Dept., Schenectady, N. Y.
F. D. Fagan, Dist. Sales Mgr., Edison Lamp Works
Frank P. Bloomer, Correspondent, S. F.
G. I. Kinney, Foreign Dept., S. F.
C. B. Johnson, Engineering Dept., S. F.
H. C. Stanley, Engineering Dept., S. F.
W. J. Delehanty, Engineering Dept., S. F.
John J. Laingor, Salesman, S. F.
W. E. Camp, Salesman, S. F.
F. O. Sievers, Salesman, S. F.
M. C. Hixson, Salesman, S. F.
J. O. Dillingham, Salesman, S. F.
E. A. Hunt, Salesman, S. F.
R. C. Mixer, Salesman, S. F.
E. W. Garcia, Salesman, S. F.
W. C. Sage, Salesman, S. F.
A. Fulton, Salesman, S. F.
L. V. Hunt, Salesman, S. F.
E. P. Markee, Salesman, S. F.
A. G. Jones, Salesman, S. F.
S. G. Gearhart, Salesman, S. F.
C. F. Forsberg, Salesman, S. F.
R. E. Kenyon, Salesman, S. F.
J. W. Van Huysen, Salesman, S. F.

Gibson Electrical Supply Company, Oakland
Rosse U. Gibson, Oakland
W. E. Arden, S. F.
L. C. Moore, S. F.
A. P. Peck, S. F.
P. S. Benjamin, S. F.
R. F. McDonald, Oakland
P. R. Litton, Oakland

Hunt Mirk & Company, Inc.
K. G. Dunn

Hurley Machine Company
E. A. Lynch

H. W. Johns-Manville Company
J. W. Thompson
J. H. Daveler

K. P. F. Electric Company
A. J. Jahl

Landers, Frary & Clark
Paul V. Quick

Majestic Electric Development Co.
Milton H. Schoenberg
T. D. MacMullen

National Conduit & Cable Company
J. E. Crilly

National Carbon Company, Inc.
J. T. Littlefield
F. G. Beck, Manager
F. P. Gillespie

Pacific States Electric Company
T. E. Bibbins, President, S. F.
S. B. Anderson, Treasurer, S. F.
A. H. Kahn, Chief Clerk, S. F.
Ralph H. Small, Salesman, S. F.
Earle P. Durley, Salesman, S. F.
Thos. H. Nelmes, Salesman, S. F.
M. E. Hickox, Salesman, S. F.
Aug. J. Lutz, Salesman, S. F.
H. R. Noack, Salesman, S. F.
Claude M. Johns, Salesman, S. F.
A. A. Elick, Salesman, S. F.
Geo. G. Drew, Salesman, S. F.
Frank Fowden, Salesman, S. F.
L. P. Vanatta, Salesman, S. F.

Panama Lamp & Comm. Co.
Jas. Thieben

Rieber Laboratories
Frank Rieber, S. F.
C. C. Warren, S. F.

Robbins & Myers Company
C. R. Hunt, S. F.
H. S. Jones, S. F.

Sangamo Electric Co. and K. P. F. Electric Co.
Noble A. Wright, S. F.

Schaw-Batcher Company
Noble A. Wright, S. F.

H. B. Squires Company
H. B. Squires, S. F.
E. G. Nelson, S. F.

Steiger & Kerr Store Co.
Chas. D. Steiger, S. F.

Wagner Electric Mfg. Company
A. J. Myers, S. F.
J. P. Perry, S. F.
J. M. Trobert, S. F.
A. F. Wells, S. F.

Western Electric Company
W. S. Berry, Salesmanager, S. F.
M. S. Orrick, Asst. Salesmanager, S. F.
Hocan, Salesman, S. F.
W. C. Martinez, S. F.
E. A. Crowson, Salesman, S. F.
W. Todt, Service Man, S. F.
C. C. Caven, Salesman, S. F.
L. J. Brown, S. F.
W. L. Neelands, Salesman, S. F.
F. I. Du Frane, Salesman, S. F.
C. L. Hynck, Salesman, S. F.

Westinghouse Electric & Mfg. Co.
K. E. Van Kuran, District Mgr., Los Angeles
C. E. Heise, District Mgr., S. F.
J. A. Nadon, Salesman, S. F.
W. P. L'Hommedieu, Mgr. Power Dept., S. F.
H. C. Hopkins, Publicity Reporter, S. F.
W. R. Dunbar, Salesman, S. F.
Waldo C. Cole, Salesman, S. F.
R. T. Behan, Mgr. Supply Dept., S. F.

Woods, Creighton & Morris
J. G. Creighton, Oakland
W. B. Morris, Oakland

Garnett Young & Company
A. E. Rowe
S. B. Hawken
E. C. Kinsey

CENTRAL STATIONS

California-Oregon Power Company
J. C. Thompson, Sec'y and Auditor, S. F.
H. C. Stoddard, Statistician, S. F.
P. O. Crawford, Supt., S. F.
Wm. Shepard, Com'l Mgr., S. F.

Coast Counties Gas & Electric Co.
S. Waldo Coleman, Pres. & Gen'l Mgr., S. F.
G. P. Egleston, New Bus. Mgr., S.F.
E. J. Sherman, Asst. Mgr., Hollister
R. L. Cardiff, Dist. Mgr.

Great Western Power Company
M. Fleishhacker, President, S. F.
J. B. Black, Gen'l Sales Mgr., S. F.
F. H. Woodward, Dist. Mgr. ,Oakland
Monty C. Pfyl, Salesman, Oakland
A. E. Clark, Salesman, S. F.
B. M. Levy, Dist. Mgr., Santa Rosa
Geo. A. Lindstrom, Salesman, S. F.
Frank W. Smith, Purch. Agt., S. F.

Northern California Power Company
Edward Whaley, Gen. Mgr., S. F.
Harry Corwin, Asst. Purch. Agt., S. F.

Pacific Gas & Electric Company
John A. Britton, Vice-Pres. and Gen'l Mgr.
A. F. Hockenbeamer, Second vice-Pres. & Treasurer, S. F.
L. H. Newbert, Mgr. Com'l Dept.
J. O. Tobey, Supt. Sacramento Dist., Sacramento
K. I. Dazey, Mgr. Collections, S. F.
R. E. Fisher, Asst. Mgr. Com'l Department, S. F.
L. F. Galbraith, Asst. Mgr. Com'l Dept., S. F.
F. Talcott, Asst. Mgr. Com'l Dept., San Francisco District, S. F.
C. W. Horton, Auditing Dept., S. F.
R. W. Dieutsch, Rate Dept., S. F.
L. F. Walsh, Mgr's Office, S. F. Dist., S. F.
John H. Hunt, Purch. Agt., S. F.
Geo. I. Williams, Asst. Purch. Agt., S. F.
J. E. Murphy, Purch. Dept., S. F.
L. M. Evans, Mgr's Office, San Francisco Dist., S. F.
J. T. Ryan, Engr. Valuation Dept., S. F.
L. B. Smith, Distribution Dept., S.F.
W. O. Stevens, Distribution Dept., Oakland
M. O. Briggs, Distribution Dept., Oakland
A. P. Parratt, Auditor Oakland Dist., Oakland
E. C. Ray, Mgr. Contra Costa Dist., Martinez
Arthur E. Caldwell, Mgr. Com'l Dept., San Jose Dist., San Jose
J. H. Pape, Asst. Mgr. Alameda County Dist., Berkeley
Wm. A. Widenmann, Mgr. Stanislaus Dist., Newman
J. H. Fagg, Supt. San Joaquin Dist., Stockton
Frederic J. Southerland, Local Agt. Richmond
Jos. Chrysostomo, Jr., Com'l Dept., Oakland
Chas. Jordan, Com'l Dept., Oakland
W. L. Price, Com'l Dept., Oakland
Capt. George Bellew Baldwin, Mgr. Com'l Dept., Sacramento Dist, Sacramento
Henry Bostwick, Mgr. San Francisco Dist., S. F.
H. P. Pitts, Mgr. Com'l Dept., San Francisco Dist., S. F.
George B. Furniss, Asst. Mgr Alameda County Dist., Oakland
Frank A. Gray, Asst. Mgr. Com'l Dept., S. F. Dist., S. F.
A. Strauch, Range Expert, Com'l Dept., S. F.
P. M. Downing, Chief Engr. Electrical Dept., S. F.
F. R. George, Chief Load Despatcher
Frederick S. Myrtle, Mgr. Publicity Dept., S. F.
S. J. Lisberger, Engr. San Francisco Distribution, S. F.
H. A. Laidlaw, Asst. Engr., S. F.
George H. Bragg, Asst. Engr. Electrical Dept., S. F.
W. R. Symmerhayes, Com'l Dept., S. F.
H. C. Ross, Com'l Dept., S. F.
O. C. Lewis, Com'l Dept., S. F.
Alfred Anderson, Com'l Dept., S. F.
Frank Nyeda, Com'l Dept., S. F.
A. J. Barbieri, Com'l Dept., S. F.
J. E. Van Hoosear, Industrial Engr. Com'l Dept., S. F.
R. A. Smith, Com'l Dept., S. F.
D. H. Rountree, Com'l Dept., S. F.
A. G. Hanton, Com'l Dept., S. F.
Cress Unger, Com'l Dept., S. F.
H. M. Crawford, Com'l Dept., S. F.
Wm. H. Augustine, Com'l Dept. S. F.
W. H. McLaughlin, Com'l Dept., S. F.
Spencer Moore, Com'l Dept., S. F.
R. W. Belson, Com'l Dept., S. F.

San Joaquin Light & Power Co.
A. Emory Wishon, Asst. Gen. Mgr., Fresno

Sierra & San Francisco Power Co.
W. L. McKinley, Right of Way Agt.
Eunice M. McKinley, S. F.
H. F. Jackson, President & Gen'l Mgr., S. F.
J. E. Woodbridge, Consulting Engr.
C. J. Rhodin, Valuation Engr.
James F. Pollard, Com'l Mgr.
R. Reid, Asst. to Val. Engr.
E. A. Richards, Chief Clerk
L. C. Helfrich, Purch. Agt., S. F.
P. F. Kelley, Salinas Gen'l Agt., Salinas

Southern California Edison Company
S. M. Kennedy, Gen'l Agt. So. Cal. Edison Co., Los Angeles

Vallejo Electric Light & Power Co.
Albert Casper, Vallejo

Universal Electric & Gas Company
E. Sproul, Supt., S. F.
R. R. Dunnigan
H. E. Grant
A. L. Stauffer, Contract Dept., S. F.
W. F. Neiman, Mgr. Com'l Dept.

Western States Gas & Electric Co.
Sam. H. Kahn, Vice-Pres. and Gen'l Mgr., Stockton
C. M. Brewer, Dist. Mgr., Richmond

CONTRACTOR-DEALERS

Cohen's Sons, L. S.
W. C. Cohen, S. F.

Decker Elec. Construction Co.
P. Decker, S. F.
J. F. Richmond, S. F.

Thomas Day Company
Walter W. Hooker
James T. Gates, S. F.

Electric Hardware Company
W. V. Riley, S. F.

Delta Electrical Company
John A. Hunt, Antioch

Electric Supply Repair Company
Al Rosenberg, S. F.

Stockton Elec. Contractors' Ass'n
R. Gnekow, Secretary, Stockton

East Bay Elec. Trade Ass'n
N. P. Ellis, Oakland

Electric Manufacturing Co.
H. G. Levy, S. F.
E. T. Cunningham, S. F.

Electric Engineering & Supply Co.
A. T. Flanagan, Stockton

Electrical Construction Co.
J. Gensler, Oakland

The Electric Shop
R. D. Smith, Sacramento
F. J. Wallace, Sacramento

Enterprise Electric Works
Geo. E. Roe, S. F.

Farnsworth Electric Works
H. T. Adams, S. F.

San Mateo
J. A. Foster

Garden City Electrical Co.
H. C. Doerr, San Jose

Electric Works
S. Gelber, S. F.

Stockton
Gould, The Light Man

Gilroy Appliance Co.
E. D. Hollenbeck, Gilroy

Greenep Electric Works
E. W. Greenep, Hollister

Gas & Electric Sales Co.
E. R. Week, Jr., S. F.

The Home Electric Co.
Berg. Varnatt, Stockton

Hyatt Electric Works
W. P. Hyatt, Sacramento

J. C. Hobrecht Co.
Wm. H. Beamer, Sacramento

Hanbridge Electric Shop
W. S. Hanbridge, S. F.

Home Electrical
M. L. Scobey, S. F.

Holtermann's Electric Shop
R. L. Marshall, S. F.

San Francisco
Sam. C. Hamilton

Improved Electric Co.
A. H. Cheney, S. F.

Incandescent Supply Co.
Austin Liebes, S. F.

Jackson Furniture Co.
W. E. Jackson, Oakland
O. M. McCoy, Oakland

Koven Electric Co.
J. L. Koven, S. F.

King's Electric Co.
Robert King, Oakland

Kohlwey, Alfs, Smith
E. W. Regensburger, S. F.
Geo. D. T. Smith, S. F.
W. D. Kohlwey, S. F.
Carl J. Alfs, S. F.

San Francisco
W. H. Kirsten

Kimball Electric Co.
E. A. Chloupek, Oakland
Hugh Kimball, Oakland

Levy Electric Co.
Sam Fingerhut, S. F.
Louis Levy, S. F.
Phil Levy, S. F.

M. C. Baker & Son
W. A. Baker, S. F.

Byington Electric Co.
Robert Byington, S. F.
H. E. Schuck, S. F.

Buzzell Electric Works
F. N. Buzzell, S. F.
Miss H. Knutsen, S. F.
R. A. Graham, S. F.
John Petersen, S. F.
H. B. Kinney, S. F.

Century Electric Co.
Frank P. Somers, San Jose

Capital Electric Co.
R. V. Oyler, Berkeley
W. T. Dunn, Berkeley

R. H. Conrad Electric Co.
R. H. Conrad, Oakland

Central Electric Co.
John Stanovich, Watsonville
J. A. Schanbacher, Watsonville

Collonon Electrical & Mfg. Co.
C. F. Collonon, S. F.

Commercial Electric Co.
C. J. Franke, S. F.

Cox Electric Co.
Walter Cox, S. F.

California Mech. & Elec. Eng'r Co.
Jas. A. Woods, Sacramento
J. P. Cedarholm, Sacramento
E. M. Coffin, Oakland

Levy Electric Co.
B. P. Jones, S. F.

M. C. Martini Electric Co.
M. C. Martini, S. F.

Maxwell Hardware Co.
Robert F. Norling, Oakland
Leo Greenwood, Oakland

F. E. Newbury Electric Co.
C. J. Newbury, S. F.
G. E. Arbogast, Los Angeles

Novelty Electric Sign Co.
Milton Birnbaum, S. F.
J. Hotchner, S. F.

NePage-McKenny Co.
A. R. Kolls, Oakland

National Electric Co.
A. L. Hughes, S. F.

Pacific Electric Motor Co.
W. L. Mitick, Oakland

Palace Hotel Co.
Edwin A. Rogers, S. F.

Pioneer Electric Co.
Charles H. Remick, Richmond

Piedmont Electric Co.
W. E. Calmbach, Oakland
F. E. Fariss, Oakland
Al. J. Connolly, Oakland

Roberts Manufacturing Co.
F. H. Thrall, S. F.

Rex Electric Co.
Tom Bennett, S. F.

Richmond Electric Co.
S. B. Hammond, Richmond

Richmond Repair Co.
T. F. Nelson, S. F.

San Francisco
Geo. A. Sittman
C. A. Bowman
G. S. Wentworth

Standard Electrical Construction Co.
Carl F. Wolf, S. F.
S. Szank, S. F.

A. Schlueter & Co.
C. C. Wand, Oakland

Solano Supply & Construction Co.
T. O. Dowdell, Suisun

Seaboard Electric Co.
W. Weisheimer, S. F.
S. Marcuse, S. F.

Sterling Electric Co.
W. A. Weigh, Sacramento

Turner Company
H. W. Baynton, S. F.

Valley Electrical Supply Co.
H. H. Courtright, Fresno

Weidenthal-Gosliner Elec. Wks.
F. W. Schultz, S. F.

A. F. Wells Co.
C. M. MacDonald, S. F.
L. J. Douat, S. F.

B. C. White Co.
B. C. White, Berkeley

Watts Electric Co.
Frank N. Watts, S. F.
N. M. Hope, S. F.

Waxon Brothers
F. Waxon, Sacramento

Advance Electric Co.
R. C. Hester, Oakland
G. L. Priest, Oakland
Miss Beatrice White, Oakland

Brumfield Electric Sign Co.
E. H. Brumfield, S. F.

Butte Engineering & Electric Co.
C. F. Butte, S. F.

Berkeley Electrical Co.
J. R. Fort, Berkeley
A. A. Smith, Berkeley

HAPPENINGS IN THE INDUSTRY

Personal Items

M. C. Turpin, formerly assistant to the manager, Westinghouse Department of Publicity, has resigned to enter federal service as assistant to the manager, Technical Publicity Bureau, Ordnance Department. Mr. Turpin's work will be on the dissemination of information from the War Department to manufacturers, through the medium of the trade press.

A. MacLachlan, of the Square D Company with headquarters at Detroit, Mich., is making a tour of all important Pacific Coast cities.

George J. Kirchgauer, of The Cutler-Hammer Manufacturing Company is receiving congratulations on the unique and helpful Electrical Directory of Milwaukee recently published by the Milwaukee Jovian League of which he is president. The directory has been published entirely at the expense of the local Jovian Chapter. There were no advertisements soliicted nor accepted since such solicitation of advertisements for publications of this kind is considered harmful to advertising in general, and as a consequence no attempt to secure assistance or donations under the guise of advertising was made.

J. G. Pomeroy, of Los Angeles, has given up the agency for the Bryant Electric Company, the change to take effect July 1st. His new connections will be announced later.

Changes and Beginnings

The Pacific Electric Company, H. V. Reynolds, proprietor and J. E. Santerre, sales manager, has opened offices in Olympia, Washington. The company will carry a full line of electrical supplies; will also do electrical wiring, electrical repair work and work on the electrical equipment of autos.

The Enterprise Electric Works has leased the building to be erected at Mission street near Eighth, San Francisco. The new quarters will be two stories high and will cover a ground space of 50x165 feet.

The Pneuvac Company, of Worcester, Mass., manufacturers of electric vacuum sweepers, have recently established headquarters in the Furnisher Exchange building, 1055 Market street, San Francisco. F. W. Bibben is the Pacific Coast manager.

Water Shortage in California

April, 1918, was about normal in temperature in California, but the precipitation was considerably below normal. For the State as a whole, the average rainfall was 0.75 inch, which is but 44 per cent of the normal amount for April. In the southern half of the State but two stations received a total precipitation of one inch or over. More than the usual amount of sunshine was received. The wind movement was high, as is usual during spring months. While killing frosts were infrequent, frosts injurious to vegetation occurred on several days in the agricultural portions of the State. Frosts occurred at Red Bluff on two days, at Fresno on three days, at Sacramento on five days, and at San Jose on five days. Streams maintained normal stages during the month, and no destructive floods were reported. Little snow fell in the mountains, while the warm sunshine and desiccating winds caused much of that lying on the ground to disappear. At the close of the month the only snow on the ground in California was that in the high Sierras and that near the summits of the isolated peaks. While there was less snow on the ground at the end of April than is usual at that time of the year, there was every indication that there would be an ample supply of water for irrigation and power purposes during the coming summer, and that the threatened shortage would occur only in a few restricted regions.

California Railroad Commission Hearing on Power Shortage

Representatives of power companies in Central and Northern California and members of the California Railroad Commission took steps at a conference recently for immediate relief of the power shortage, caused by the light rains and by the increased depants for electric energy by war industries. They agreed:

1. That the utilities shall pool their power.

2. That the Commission shall prepare a priority list of consumers by which industries manufacturing articles not essential to the war shall be the last served.

3. That a representative committee shall work out a method of compensating some of the smaller power and power purchasing companies whose business is certain to be affected by the priority rules.

The priority regulations are yet to be worked out, but it was emphasized that railroads, ships, utilities and Army and Navy industries shall first be served. Other industries will be grouped under various classifications, those manufacturing war necessities to have the preference in being given power.

Mortimer Fleishhacker of the Great Western Power Company said that the drought threatened California's food production, and that unless the power companies were in a position to furnish sufficient electric energy for pumping for irrigation purposes, crops would be hard hit. To furnish this power, he said, some of the non-essential industries must make the sacrifice.

Chief Counsel C. P. Cutten of the Pacific Gas and Electric Company said that while he desired to co-operate with the Commission and his company desired to be in the pool, his company would object to reimbursing any of its smaller customers that might suffer because of the curtailment of power to non-essentials.

H. F. Jackson, general manager of the Sierra and San Francisco Power Company urged the Commission to look after relief for the shortage immediately and to lose no time in working out the financial problems that will follow.

D. M. Folsom of the Fuel Administration said oil had nothing to do with the power shortage, and that there would be no confusion between the oil priority list and the power priority list because a person barred from getting oil would not be permitted to get power generated from oil.

Ralph Merritt, Federal Food Administrator, said the Government would back the State and the utilities in enforcing the power priority list.

The Commission declined to have any of its members named on the committee to work out details of the priority list, on the ground that it might embarrass both the committee and the Commission. The utility representatives then met and named this committee: Samuel Kahn, Western States Gas and Electric Company; John A. Britton, Pacific Gas and Electric Company; Mortimer Fleishhacker, Great Western Power Company; H. F. Jackson, Sierra and San Francisco Power Company; Albert Caspar, Vallejo Electric Light and Power Company; S. W. Coleman, Coast Counties Gas and Electric Company, and Edward Whaley, Northern California Power Company.

L. S. Ready, of the engineering staff of the California Railroad Commission, was named by this committee as power director. His duties, the committee plans, shall be to see that the priority list is adhered to and to make such recommendations for interconnections between the various power companies as may appear feasible during the period of the war.

Finance Corporation Helps Utilities

The War Finance Corporation at Washington is displaying unusual energy in considering the needs of public utility corporations, according to the Financial World. At its first meeting the officials considered 62 applications for loans or for license to refund maturing obligations from utility corporations, and approved sixty of these as having merit, disapproving only two. The amount of loans considered totaled $172,069,605 and the aggregate approved was $166,069,605. Of this total $125,860,284 was for refunding purposes, the aggregate of new issues being $40,209,321. New issues last year for the same period totaled $107,504,075, so it is apparent that public utility corporation directors and officials are quite alive to the necessity for curtailment whenever possible, and it is also of some significance that so many corporations feel confident that they can refund maturing obligations by the issuance of new securities, extending the maturing obligations for a certain period.

Practically all refinancing to be done will be put through on a higher interest basis, and the obligations given in exchange for the maturing notes or bonds will be for short maturities, from one to three years usually, and it is believed the improved position of public utilities as a whole, with larger income assured by reason of a revision of rates upward, will develop a renewed confidence in the public utility situation. It is interesting in this connection to compare the classes of new securities considered by the War Finance Corporation and approved or disapproved. The public utilities make by far the best showing. The figures follow:

	Municipal.	Utility.	Industrial.
Number considered	192	62	108
Number approved	140	60	77
Number disapproved	34	2	24
Number curtailed	18	0	5
Amount considered	$86,878,512	$172,069,605	$219,510,296
Amount disapproved	19,791,665	6,000,000	39,900,000
Aggregate approved	69,086,847	166,069,605	179,610,269
Less refunding	21,392,312	125,860,284	111,411,900
Aggregate new issues	45,694,534	40,209,321	68,198,369
New issues last year same period	108,952,865	107,504,075	287,754,684

The policy to be pursued at Washington is that corporations must be able to earn fixed charges before being allowed any advances from the War Finance Corporation.

Trade at a Glance by Bradstreets

San Francisco

Wholesale and Jobbing Trade—Good.
Retail Trade—Fair.
Manufacturing and Industry—Very Active.
Collections—Fair.
Evidence of increased activity and speed in Government work, especially shipbuilding.

Seattle

Wholesale and Jobbing Trade—Good.
Retail Trade—Good.
Manufacturing and Industry—Active.
Collections—Fair.
Crops—Good.
Large increase in crop area.

Tacoma

Wholesale and Jobbing Trade—Good.
Retail Trade—Good.
Manufacturing and Industry—Very Active.
Collections—Good.
Rains and warmer weather beneficial to crops.
Shipbuilding facilities to be increased; housing and transportation of workers are problems now receiving attention; labor of all kinds in strong demand.

Portland

Wholesale and Retail Trade—Good.
Manufacturing and Industry—Active.
Collections—Fair.
Shipbuilding—Expanding.

Los Angeles

Wholesale lines somewhat improved.
Retail still reported slow.
Collections only fair.

A National Trade Mark

The National Trade Mark Bill now before Congress aims to prevent the situation now occasionally coming up where an American manufacturer is shut out of a foreign market owing to the fact that an unscrupulous foreign merchant has "pirated" his trade mark.

In the case of a trade mark, owned and protected by the Government, this American manufacturer could outwit the pirate merchant by merely substituting the national trade mark for his private mark on all shipments to that country. The intention is not to make the use of such a trade mark compulsory. The mark should be granted, it is urged, only to the manufacturers of goods that reflect credit on the industries of the country.

The measure providing for a national trade mark is only one of a number now being put in shape and considered by the Department of Commerce with a view to preparing the American manufacturer and exporter to hold his own in the struggle for world trade that is expected to follow the making of peace.

California Water Commission Notes

The following applications for permission to appropriate water have been filed with the State Water Commission:

The Nevada-California Power Company of Riverside makes application for 12 second feet of Birch Creek in Inyo county for the generation of electric energy to be developed at existing power plants Nos. 2, 3, and 4, by falls of 913, 791 and 995 feet respectively, the horsepower to be developed being 1244, 1079 and 1356 theoretical horsepower, respectively. The estimated cost of the works is $42,500.

The Southern Sierras Power Company of Riverside applies for 12 second feet of Birch Creek, when said water may be available for the generation of electric power at existing plants Nos. 5 and 6 of this company. It is proposed to develop 500 and 513 theoretical horsepower by falls of 366 and 230 feet, respectively. The estimated cost of the work is $42,500.

The Waterford Irrigation District, by E. N. Bryan, chief engineer, applies for 150 cubic feet per second of waters of the Tuolumne river in Stanislaus county for the irrigation of 13,866 acres within the district. It is proposed to divert the water by means of a pumping plant, there being an upper canal 6¼ miles long and a lower main canal 9½ miles in length. The plan is to use the pumps for a supplementary supply when there is a lack of water from the district's original appropriation at the La Grange Dam, above the point of diversion of the present application. The estimated cost of the works is $175,000.

R. M. Birchell of Le Grand applies for 2000 gallons per minute of waters of Mariposa Creek in Merced county, by means of a centrifugal pump for irrigation purposes.

G. H. Canoles of Delevan applies for 12 second feet of Hunter's Creek in Colusa county for the irrigation of 513 acres of rice lands by means of an electric pumping plant.

Charles E. and Minnie Longton of Sacramento make application for 1 second foot of Empire Gulch, tributary to Black Creek in Calaveras county for power purposes, water to be returned to the stream after use.

Albert Fischkeller of San Francisco applies for 1¼ second feet of Palo Verde Lagoon in Imperial county for irrigation on forty acres, by means of a pumping plant.

Hastings Tract Company of San Francisco applies for 600 cubic feet per second of the waters of Lindsay Slough, tributary to the Sacramento river in Solano county, for the irrigation of 60,000 acres to be planted to rice and other crops. The water for the proposed project is to be diverted by means of electric pumping plant.

E. E. Lindsey of San Francisco applies for 30 cubic feet per second of the waters of Buck's Creek, tributary to the North Fork of the Feather River in Plumas county, for the generation of power for mining and manufacturing purposes.

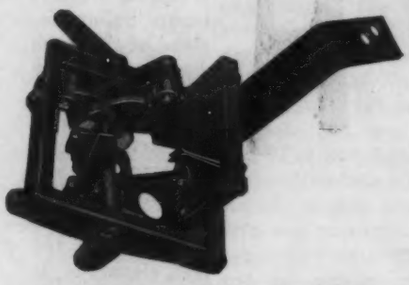
Charles T. Ross of San Francisco makes application for 20,000 acre feet of the waters of the South Fork and the Middle Fork of Cosumnes river in Amador and Eldorado counties, and a like amount of the waters of the South Fork of Dry Creek just below its junction with Dead Man's Creek, and also at Irish Hill, and 5000 acre feet at Sutter Creek, tributary to Dry Creek, in Amador county, said waters to be used for the irrigation of 30,000 acres.

LATEST IN EVERYTHING ELECTRICAL

(An automatic controller which makes it possible to maintain an even temperature for an indefinite period and a self-timing circuit breaker are two of the important new devices presented below. Among the interesting developments which are to be of great importance under later war conditions is the encouragement of new fields for the usefulness of the crippled or blind—as recorded here in the case of the taping of coils.—The Editor.)

AN ENCLOSED FLOAT SWITCH

Anyone familiar with installations of remote control pumps, such as pumps in the basements of buildings and tank pumps along railroad right of ways, knows that the pumps and motors receive very little attention, and the float switch still less when the motors are started and stopped by such a device. As long as the water gauge shows a good supply of water in the railway water tank the attendant will not trouble himself to know whether the float switch is covered with ice and dirt or whether the operating mechanism of the switch can operate properly. Overflowing of water tanks are not uncommon occurrences. Realizing the lack of attention given to float switches and the severe conditions under which they must operate, the Cutler-Hammer Manufacturing Company, of Milwaukee, has developed an enclosed weatherproof float switch built so heavy it will stand lots of abuse and with an operating mechanism that will positively open and close with the rise and fall of the float. One of the chief objections to some switches is that they get out of step, if for any reason the switch fails to latch in. This happens through the contacts becoming badly burned which prevents the blade from entering the clips. Or where the blades become bent out of adjustment the same result follows. When the latching mechanism of such a switch gets out of step, the switch opens when it should close and vice versa. The design of the new C-H switches makes this impossible. The switch can only be open when the lever is in one position and only closed when in the opposite position.



Operating mechanism of enclosed float switch

C-H enclosed float switch showing wall mounting and view with lower enclosure removed.

A cast iron case provided with mounting ears carries all of the operating mechanism and terminals. A hole is tapped and bushed in the top of this case for the entrance of conduit. The arrangement permits removing the lower enclosure without disturbing the operating mechanism or connections. The new operating mechanism consists of a cam and roller. The arm carrying the roller is pinned to the main shaft which is turned by the outside cast iron lever. The cam is made of malleable iron and is cast integral with the sleeve carrying the switch blades. This sleeve turns on the main shaft. When the main shaft is rotated, the roller is driven up the side of the cam tightening an elliptical spring. When the roller passes the point of the cam the tension of the spring either opens or closes the switch. This is the positive part of the mechanism as the switch will always be open when the roller is on one side of the cam and always closed when on the other side.

These switches are furnished complete with a sheet copper float having conical ends, float rod, and a heavy float rod guide. Conical end construction is used on the copper floats which gives a greater strength than flat ends and there is less chance of the float opening at the end seams. Various mounting and controlling arrangements are furnished. The single pole switches are intended for use in connection with a starter for controlling A. C. or D. C. Motors. The two, three or four-pole float switches are designed for single phase self starting and polyphase squirrel cage motors which may be thrown directly across the line to start. They can also be used for direct current motors when used with a suitable self starter. These multi-pole switches have a maximum capacity of 5 H. P. at 110 volts and 7½ H. P. at 220, 440, or 550 volts.

THE BLIND TAPING COILS

Last fall the question of securing some help from the blind was taken up by the Westinghouse Electric and Manufacturing Company with the Pennsylvania Association, a branch of which is located at Pittsburgh, and a sample lot of motor coils to be taped was sent to the Association in order that the employes might be given a chance to show what they could do. When the coils were returned, it was very evident that this work could be done in an entirely satisfactory manner by those who have been deprived of their sight. Accordingly, arrangements were made with the management of the Association to allow some of their employes to do this work, payment to be made on a piece work basis.

An Opportunity for the Blind

As this was an entirely new line of work for them, it was decided to have a representative of the Association go to East Pittsburgh to become familiar with the work so as to instruct those assigned to do the work. The representative selected for this training was the wife of a former Westinghouse employe, who was deprived of his sight last summer, and who is now employed at the Association. She went to East Pittsburgh and was employed until such time as the management felt that she was sufficiently proficient in the taping of coils to teach the blind and inspect their work.

In order that they may not suffer any loss of revenue, while learning this new work, the Association is paying them the difference between what they earned at their former employment, and what their present production would entitle them to receive.

CIRCUIT BREAKER WITH TIMING ATTACHMENT

A self-timing circuit breaker for the protection of motors during starting or running is being manufactured by the Roller-Smith Company, 233 Broadway, New York City.

Barrier controlled by two independent methods

Interposed in the path of the trip armature is a pivoted hook-shaped barrier under two independent controls. One control is thermal and depends upon the expansion of an iron rod. This rod is heated at the same rate as the motor, which is being protected by the same current that operates the motor. When the rod expands it retracts the barrier, causing the breaker armature to trip when the heating is excessive. It does not matter how this excess comes about—it may be either a prolonged starting current in the motor or a variable load with high requirements.

The other control, which is electro-magnetic, retracts the barrier instantaneously if a mechanically dangerous load is suddenly applied.

Both controls are adjustable for either the maximum current which may continuously flow or the emergency overload value. They may be adjusted independently if desirable. Ordinarily, however, the controls are set to protect the average motor of normal ampere rating, therefore no further adjustment is required.

UNIVERSAL HEATING PAD

The Universal Heating Pad manufactured by Landers, Frary & Clark, New Britain, Conn., has a number of unique features.

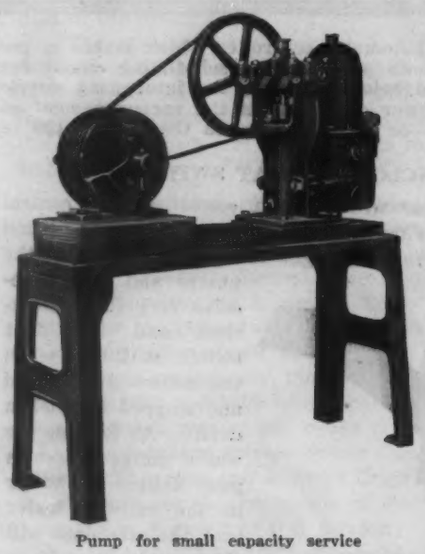
Chief among these is the spirally wound heating wire, permitting flexibility without danger of breaking. Temperature control is by permanently calibrated thermostats, selected by a simple one-piece lever switch. Guesswork and the hazard of overheating are eliminated.

Another important feature is the positions of the four thermostats. No matter how the pad is folded, no large fold can be made which does not include a thermostat. Hot spots and the resultant fires are done away with.

The cover is gray eiderdown and a washable slip is furnished. 10-foot cord is supplied with switch placed a convenient distance from the pad.

NEW ELECTRIC-DRIVEN PUMP FOR SMALL CAPACITY SERVICE

The Goulds Mfg. Co., Seneca Falls, N. Y., have recently developed a new pump for service in homes, summer cottages, camps, dairies, small hotels, etc. This pump is known as the "Hi-Speed" and its predominating feature is its high speed of 500 R.P.M. which allows the pump to be belt-connected to the motor with only a small reduction and consequently with a small pump pulley instead of the large diameter pulley commonly used.



Pump for small capacity service

The pump is of the vertical reciprocating type and is suitable for pressures up to 43 pounds or 100 feet elevation. It is made in two sizes, 1¼-inch diameter with 1⅛-inch stroke and 2-inch diameter with 1⅛-inch stroke. The former has a capacity of 3 gallons and the latter a capacity of 6 gallons per minute.

All the gears have been eliminated in the pump to insure quiet operation. The outfit is self-oiling, the bearings being fitted with ring oilers, and the main bearings are fitted with renewable bronze bushings. The crank-shaft is counterbalanced to insure smooth operation at the high speed of the outfit.

The outfits are furnished complete with pump and removable legs, as desired.

The outfits are furnished with ¼ horsepower, 1750 r.p.m. Robbins & Myers motors.

AUTOMATIC ELECTRIC CONTROLLER

This controller is a small unassuming looking device, 2x2x5 inches, quite simple in mechanism, made by the Automatic Electric Controller Co., Seattle, Wash. It is attachable to all electric heating appliances used on lamp sockets. It stands in the same relation to them that the governor does to the steam engine, or the safety valve to the boiler.

To illustrate heat control and economy by using the A. E. Controller: Attach the controller to the cord of an electric iron, set the regulator to the degree of heat required and forget it—as one is apt to do with electric irons with dire results. The iron may stand for days, but will never grow hotter. The heat shuts off and comes on again automatically, and thus a steady temperature is maintained indefinitely. No pulling out the plug to cool, no waiting to heat, no fear in forgetting, and it cuts the lighting bill in half! This is the way it works with all appliances, besides saving your elements and lessening fire risk.

Another great advantage in using the A. E. Controller in applying electric heat to the body, is the ability to start, say, at blood heat and gradually increase the temperature until the desired maximum is reached. Then by adjusting the regulator the temperature remains uniform.

It is attachable to toasters and other cooking appliances, to incubators, floor mats, vulcanizers, or wherever a uniform temperature must be maintained. But nowhere is its economy, efficiency and safety more appreciable and necessary than in application of electric heat to the body by means of pads, blankets, face masks, mats, etc.

BOOKS AND BULLETINS

New Catalogue

Appleton Electric Company, 218-30 N. Jefferson street, Chicago, Illinois, announce their new 160 page catalogue covering the complete line of "Unilets" and other conduit fittings which they manufacture. This catalogue is furnished in two sizes, viz., standard electrical manufacturers size, 8 x 10½ inches, and also in convenient pocket size, 4 x 5¼ inches. The catalogue contains numerous new fittings recently placed on the market by this company and a feature of the catalogue is the pictorial index which makes it practically easy for the workman to select fittings required for the installation. Catalogue in either size sent upon request.

Upbuilding of the Industry

"The New Traction Problem" is discussed in a recent pamphlet by Theodore P. Shonts, president of the Interborough Rapid Transit Company of New York.

An extremely interesting 125-page circular (No. 75) on Safety for the Household has been recently issued by the Bureau of Standards. The purpose as stated is (1) to emphasize the seriousness of certain risks frequently occurring in or about the home, (2) to give simple methods of care and caution to protect life and property from such hazards, and (3) to stimulate interest in public measures to provide safety for the household and the community. Some 35 pages of the bulletin are devoted to electrical hazards and household practice in regard to them.

The fourth annual report of the Public Utilities Commission of the State of Idaho for the year 1916-1917 is available for distribution. The booklet gives a brief resume of all cases appearing before the commission and discusses the Idaho situation from the public utility's standpoint.

Electrical Apparatus

Bulletins Nos. 183, 184 and 185, recently issued by the Crocker-Wheeler Company, cover the subjects of "Motor Drive for Printing Machinery," Direct Current Lighting and Power Generators" of direct connected and engine types and "Coupled and Belt Types of Alternating Current Generators." These catlogues are from 4 to 8 pages in length and perforated for loose leaf binding.

A 30-page bulletin on Direct Current Standard Unit Panels for general power and lighting service has been recently issued by the General Electric Company under the number 47070.

A well illustrated, 8-page bulletin issued by the Ward-Leonard Company covers the subject of the "Method of Determining the Size of a Battery Charging Rheostat."

A bulletin on Miniature Direct Current Iustruments has recently been sent out by the General Electric Company, designed especially for users of small panels, automobile starting sets, electric vehicles and generally for small direct current installations.

A universal charging rheostat for the charging of starting, lighting and ignition batteries is advertised in an envelope folder gotten out by the Ward-Leonard Electric Company of Mount Vernon, N. Y.

A light weight substantially built Hand Magnet which has become extensively used by smelters and refiners, metal dealers, iron and brass foundries, machinists and others is illustrated and described in a new leaflet (publication No. 250) just issued by The Cutler-Hammer Company of Milwaukee, Wis. This hand magnet weighs 8 pounds and has a cast aluminum covering, is operated with a simple trigger and is very useful in separating iron or steel from copper, brass, antimony, tin, and other non-magnetic substances.

"Electrical Equipment for Cement Mills" is the title of the special publication (or circular No. 7174) just issued by the Westinghouse Electric & Manufacturing Company. The pamphlet has an attractive art cover, illustrating the interior of a motor driven cement mill, while numerous photographic reproductions are given throughout the publication showing the application of motors to various types of machinery employed in cement mills. Advantages of motor drive for this class of service, and characteristics required by motors to be specially successful, are given briefly.

Appliances and Supplies

A price and data book on Small Circuit Breakers has recently been issued by Ray D. Lillibridge, Inc., for their client the Ward-Leonard Electric Company at Mount Vernon, N. Y.

A series of attractive pamphlets and folders was issued by the G-E division of the Edison Electric Appliance Company in conjunction with their "Iron Sales Week" which was devoted to the pushing of iron sales throughout the country.

Westinghouse fans form the subject matter for an attractive folder sent out to dealers with a showing of cuts available for retail advertising.

The announcement of a Hotpoint Advertisement which is to appear nationally on June 29th is made to the trade through an attractively illustrated folder containing a facsimile of the advertisement.

"Eye Comfort," a most attractive folder recently published by the National X-Ray Reflector Company, contains loose leaf circulars of various types of illumination.

A catalogue and price list of Hotpoint electrical appliances is furnished to dealers by the Hotpoint Division of the Edison Electric Appliance Company.

P. & S. Pull Canopy Fixture Switches are the subject matter of bulletin 52-A issued by Pass & Seymour.

A recent V.V. Fittings catalogue attractively gotten up with a picture of shipyard construction on the cover lists their complete line of marine fittings.

A new folder (publication No. 235) has recently been issued by The Cutler-Hammer Manufacturing Company of Milwaukee and New York which illustrates and describes C-H Electric Industrial Stoves for laboratories, printing and publishing plants, celluloid, hat and shoe factories, test rooms, and industrial service in general. The stoves are made in two types; one has a rectangular heating surface, and the other a disc or circular surface. The heating units are electrically welded to the working surface. The folder describes other details of construction and gives sizes, wattage and other data.

A Bibliography of Municipal Utility Regulation and Municipal Ownership

by Don Lorenzo Stevens of Harvard University; size, 6 x 9 in.; 410 pages; published by the Harvard University Press, Cambridge, Mass., and for sale by the Technical Book Shop, San Francisco. Price $4.00.

The need for a comprehensive and intelligent bibliography on business subjects has long been felt by librarians and busy readers—and in the case of the one subject of municipal utilities this need has now been met. The work covers writings on the subjects of the History of Utilities and Regulation, Franchises, Public Service Commissions, Valuation, Rates, Taxation, Holding Company and Municipal Ownership, and is intended for public service company managers, commissioners, lawyers and others interested in public utilities.

The list is very complete and covers thoroughly all recent works in English on these subjects down to 1917, and the best of the earlier ones. The general fields of electricity, gas, water and traction utilities are included and wherever possible a short descriptive note on the book is appended.

Aside from the fact that no such bibliography can be brought down to date, and that any book of this nature is in some measure out of date at the time it is published, the work is one which will prove of great value to utility men.

NEW ELECTRICAL DEVELOPMENTS

(Considerable activity is reported in the extension and enlargement of power plants and transmission lines in the Northwest. In the Central and Southwestern districts, interest centers in proposed improvements in lighting districts or new installations. The increase in ship building and establishment of shipyards promises an increased load from this source. A new transmission line to Ely and the electrification of several of the larger mining properties mark the two weeks period in the Inter-mountain district.—The Editor.)

THE PACIFIC NORTHWEST

WILSONVILLE, ORE.—The electric light plant of N. W. Young has been sold to the Molalla Electric Company.

NEW WESTMINSTER, B. C.—The Timberland Lumber Company is erecting a saw mill on the Fraser river, to cost about $100,000.

BREMERTON, WASH.—The Senate has increased the amount of $200,000 for power house here provided by the House to $325,000.

SALEM, ORE.—Bids are being received for the installation of the electric lighting system on the Salem bridge over the Willamette river.

NEW WESTMINSTER, B. C.—Improvements and extensions involving an expenditure of about $5,000 are contemplated to the municipal electric light plant.

SEATTLE, WASH.—Puget Sound Traction Light & Power Company is to construct a reinforced concrete smoke stack at its Georgetown plant, 235 feet high and to cost $15,000.

SEATTLE, WASH.—NePage McKenny Company, electrical engineers and contractors, Armour building, will make extensive additions to their plant. The capital of the concern will be made $60,000.

WATERVILLE, WASH.—Application has been made to the Douglas County Commissioners by the Chelan Falls Power Company for permission to construct and maintain an electric transmission line in Douglas County.

OLYMPIA, WASH.—George W. Dilling of Seattle has made application to the state hydraulic engineer for 11,000 second feet of water from the Skagit river for the development of 40,000 horsepower. The estimated cost is $2,000,000.

LOON LAKE, WASH.—Plans have been prepared for the construction of a 100-ton concentration mill at the plant of the Loon Lake Copper Company, to cost about $40,000. The plans provide for the installation of considerable electrical machinery.

SEATTLE, WASH.—An ordinance has been introduced in the city council authorizing the Board of Public Works to prepare specifications and advertise for six one-man single truck steel cars and 20 double truck steel cars for the municipal railway which is now under construction.

SEATTLE, WASH.—Plans are being prepared by Daniel Huntington, city architect, for the addition of another floor to the municipal auxiliary steam-driven electric plant at Eastlake Avenue and Nelson Place. The additional space is to be utilized as an electrical testing laboratory.

EVERETT, WASH.—Although the plan of the city to launch a movement for municipally owned and controlled light and power plant is about ready to be placed before the voters, it is thought that the council will forego any action of this kind until after the close of the world war.

PORTLAND, ORE.—The next step for the construction of the proposed hydro-electric plant by the Big Bend Transit Company will be the purchase of the overflow lands on the south side of the river. The Big Bend Transit Company is a corporation and proposes the construction of an electric line from this city down the Spokane river to its junction with the Columbia at Miles. William A. Nicholls of Spokane is president of the company.

SEATTLE, WASH.—The Standard Underground Cable Company was awarded the contract for furnishing the city with 70,000 pounds of copper wire at $19,636.

REEDSPORT, ORE.—Preliminary plans are being prepared by the Umpqua Light & Power Company for the construction of a new electric transmission line across the Umpqua River at Reedsport. The Umpqua company recently took over the property of the Gardiner (Ore.) Light & Power Company.

SPOKANE, WASH.—The Westinghouse Electric and Manufacturing Company of Pittsburgh, Pa., it is reported, has acquired the controlling interest in the Spokane Heat, Light & Power Company, which operates a central heating, lighting and power plant, furnishing service to the central district of Spokane.

CHEHALIS, WASH.—Chehalis may be forced to have another election to pass on the franchise sought by O. E. Anderson and associates for another light and power company. It is declared by a petition asking for a re-submission to the voters and presented to the city fathers that the recent franchise election was illegal.

SEATTLE, WASH.—The plant of the Vulcan Manufacturing Company has been purchased by the Frank Waterhouse Company, which proposes to expend several hundred thousand dollars to enlarge the property. Main engine castings, heavy overhead traveling cranes, cargo winches, shaftings, etc. are manufactured in the plant.

EUGENE, ORE.—The automobile association has appealed to the city council for lights to be installed in the auto camping park, north of Skinners Butte. The matter had been taken up with the water board, who referred same to the city council. This body referred it to the water and light committee, with power to act.

PORTLAND, ORE.—Preparations, it is reported, are being made by the Pacific Power & Light Company for the erection of a 6600-volt, three-phase transmission line to supply service to two beet-sugar factories of the Utah-Idaho Sugar Company. The company is also planning to build a new outdoor substation near Kahlotus.

SOUTH BEND, WASH.—The Willapa Power Company has been given the right to condemn property for its big dam so that it will be possible to supply the city with water. It gives the home company control of the supply of water on the South Fork so that South Bend can have its own water works when the present franchise expires.

VANCOUVER, B. C.—The Jarvis Electric Company of Vancouver has been awarded the contract for electrical machinery to be installed on the three auxiliary sailing ships under construction by the William Lyall Shipbuilding Company, including three generators, directly connected to gasoline engines, electrically driven sail hoists and motor equipment for air-compressors and bilge pumps.

VANCOUVER, B. C.—Sealed proposals will be received by the Columbia River Interstate Bridge Commission June 28, 1918 at 11 a.m. at the court house here for furnishing all materials and covering all work necessary in the erection of a transformer house to be located in this city. Certified check for ten per cent of the bid payable to Rufus C. Holman, chairman, is desired with bid.

PORTLAND, ORE.—The Liberty Foundry, Inc., recently incorporated, has leased the plant of the Lister Sash Weight Company, which it proposes to equip for a foundry and machine shop. The company contemplates adding electric welding and brass and bronze casting departments. William Cornfoot, shipbuilder, is among the incorporators.

HANFORD, WASH.—Application has been filed at the land office by the Blackrock Power & Irrigation Company asking for an easement for the erection of a high-tension electric transmission line from Hanford to Priest Rapids, a distance of 35 miles. The company, it is assumed, contemplates irrigating a large tract of land lying above the proposed high line canal.

SEATTLE, WASH.—Sealed bids will be received by the Board of Public Works up to 10 a.m. Friday, June 21, 1918 in room No. 234 County-City building, for furnishing one 1000 kilowatt motor generator set for the city light department in accordance with specifications approved by the board on May 31st, 1918 and now on file and ready for distribution in room No. 234 County-City building. Amount of bond successful bidder will be required to furnish will be equal to 100 per cent.

OLYMPIA, WASH.—Sealed bids will be received by the State Board of Control, Olympia, Wash., until 11 a.m. Monday, June 24, 1918, for cottage and power house at state school for girls, Grand Mound, Wash. Bids are to be in sealed envelope addressed to the Secretary of the State Board of Control and to be let in separate contracts as follows: General contract, heating and central power plant, plumbing contract, wiring and installation of generator set. Each bid must be accompanied by a certified check in the sum of five per cent of the bid price payable to the secretary of the State Board of Control.

TACOMA, WASH.—The City Lighting Department is considering a contract with the Tacoma Railway & Power Company, under which the company will install, maintain and operate the large generator which the city has purchased and for which no space has been provided. The Tacoma company has offered for $1,800 per year to install and operate the generator and hook it up with its own switchboard, so that if the peak load were exceeded the company could cut in the city line on its own current. Hamilton Gronen, commissioner of light, estimates that it would cost the city $10,000 to build a substation on the tide-flats and $4,500 for salaries to operate the plant.

SALEM, ORE.—The applications of the Portland Railway, Light & Power Company, one for permit to construct the Timothy Meadow reservoir on Oak Creek in Clackamas county, and the other for permit to appropriate 667 second feet of stored waters together with waters of Clackamas river have been approved by State Engineer Lewis. In the Timothy Meadow it is proposed to store 40,000 acre feet of water. The project involves the construction of a dam 80 feet high and 442 feet long and will cost about $300,000. In connection with the permit for the appropriation of 667 second feet of water, it is proposed to develop 10,000 horsepower at a cost of about $1,250,000. The filings of the company were made to renew rights which the company obtained several years ago. Under the law construction work on these projects must be commenced within one year and be completed within five years.

THE PACIFIC CENTRAL DISTRICT

BOLINAS, CAL.—The Chetco Mining Company is contemplating the installation of electrically driven pumping equipment at its local properties.

SAN JOSE, CAL.—The petition of Giles Bradley and others asking to erect and maintain a telephone line to connect Morgan Hill and Uvas was granted.

SAN FRANCISCO, CAL.—J. M. Dougan of this city has been awarded the contract for the erection of a $200,000, six-story building for the Pacific Telephone and Telegraph Company in Oakland.

SAN FRANCISCO.—G. H. Canoles of Delevan has applied for 12 second feet of Hunter's Creek in Colusa county for the irrigation of 513 acres of rice land by means of an electric pumping plant.

VISALIA, CAL.—C. D. Bahler of the Visalia Battery Company has taken a partner, extended the business and changed the name. The business will henceforth be known as the Bahler & Brady Electric Company.

SAN FRANCISCO, CAL.—The Board of Public Works has awarded a contract to the General Electric Company at $39,162 for furnishing and delivering to the Hetch Hetchy site locomotives of the electric storage type.

COLUSA, CAL.—At the next meeting of the County Supervisors the petition asking the formation of the Colusa County Irrigation District will be considered. The State Engineer has reported favorably on the proposed project.

MODESTO, CAL.—Plans are being considered by the Sierra & San Francisco Power Company for extensive improvements, including the construction of a hydro-electric power plant on the Middle Fork of the Stanislaus river.

BERKELEY, CAL.—The contract awarded the Pacific Fire Extinguisher Company by the City Council for street lighting has been declared void by the District Court of Appeals in the district embraced by Derby, Warren and Garber streets.

ANGEL'S CAMP, CAL.—The Pioneer mine will sink the shaft, now 135 feet in depth, to the full depth of 600 feet. A station will be cut at a depth of 300 feet and another at the 600-foot depth. Electric power will be installed to operate the machinery.

SAN FRANCISCO, CAL.—In preparation for the sale of the second unit of Oak Knoll Manor, Lavelle & Holt have closed a contract for the installation of a water system and electric light service on both the second and third units of their home park.

ALTURAS, CAL.—The Long Valley Irrigation District with headquarters at Doyle, Lassen county, was endorsed by the executive board of the Northern California Counties Association in session here. The association will ask federal aid for the development of the project.

WILLOWS, CAL.—Bonds of $175,000 with which to finance construction of the proposed Princeton-Codora-Glenn Irrigation District have been voted. The funds will provide for the acquisition of a portion of the canal and laterals constructed by the Sacramento Valley Irrigation Company.

SACRAMENTO, CAL.—An increase of three to five cents an hour in the pay of 175 motormen and conductors employed on the local street car system operated by the Pacific Gas and Electric Company was announced by representatives of the company. It was to become effective immediately.

TRACY, CAL.—The directors of the West Side Irrigation District, John C. Chrisman, secretary, have awarded a contract to the Electric Machine and Equipment Company, 124 N. El Dodaro street, Stockton, at $2,939.90 for the construction of telephone lines in the district. The only other bidder was C. H. Laiblin of Manteca.

REDWOOD CITY, CAL.—The Board of Supervisors have ordered that an election be held on June 11th in the proposed "San Carlos Highway Lighting District of San Mateo County," at which time will be submitted the question of whether or not the territory in the proposed lighting district shall be organized and formed into a highway lighting district.

TRACY, CAL.—The second issue of bonds of the West Side Irrigation District amounting to $100,000 will be sold July 2. There is a growing demand for the extension of irrigation on the West Side and there are several schemes afloat for the inclusion of land in this district and for the

formation of new districts, to take in land east and south of Tracy.

SAN FRANCISCO, CAL.—A half million dollar order for vacuum valves, auxiliary wireless apparatus, has been placed with the Moorhead Laboratories by the British government. This apparatus will increase the range of British wireless stations from 100 to 800 per cent. A factory is under construction at 648 Mission street. Three shifts of 10 persons each will be employed.

SAN FRANCISCO, CAL.—Plans of the Bethlehem Steel Company for the construction of a large steel ship repair plant at Hunter's Point, San Francisco, have been accepted by the United States Government. The work includes the erection of machine shops, fabricating plants, marine railroad and other equipment. Three floating docks with a capacity of 8000, 4000 and 3800 tons, respectively, are to be moved to the new location, and two additional docks built. The cost of the entire project is estimated at $2,000,000.

THE PACIFIC SOUTHWEST

LOS ANGELES, CAL.—The Board of Public Service Commissioners is inviding bids for 33,000 volt oil switches.

LOMPOC, CAL.—It is stated that the Lompoc Light & Power Company plans to spend between $5000 and $10,000 in improving the plant and distributing system in Lompoc.

SANTA ANA, CAL.—Plans have been filed by Kaufman & Sons of Santa Ana for the erection of a new factory at 1625 East First street. The company manufactures spot lamps.

PORTALES, N. M.—The city council has called a bond election for $20,000 for repair and extension of city water, sewer and electric utilities. The election will be held on June 1st.

KINGMAN, ARIZ.—Preparations are being made by the Schuylkill Mining Company for the installation of a power plant to furnish power for its proposed 200-ton milling plant, now under construction.

SAN DIEGO, CAL.—The city council has passed a resolution that steps will be taken to light Sixth street and Park Boulevard in the near future, and that property owners should install and pay for the lights.

SANTA BARBARA, CAL.—The city council has adopted a resolution granting the Santa Barbara Telephone Company the right to erect and maintain appliances and conductors for certain thoroughfares of the city.

HOLTVILLE, CAL.—The Board of Supervisors have given the Winterhaven Improvement Company the privilege of laying the water and gas mains and installing a system for conducting electricity for Winterhaven and vicinity.

BAKERSFIELD, CAL.—The Willard service station, under the new management of O. Davidson, is making extensive changes in their place of business. The electrical department is being remodeled and equipped with everything electrical.

LONG BEACH, CAL.—Condemnaton proceedings for streets in the harbor district, making possible other improvements necessary to local industries, will be started soon. The streets will be paved, lights installed, also sewers and water mains laid.

LOS ANGELES, CAL.—The Pacific Electric Railway Company has been ordered by the city council to remove its center poles and replace them with span poles to carry its trolley wire between Reservoir and Effie streets, on its Glendale-Edendale line.

SANTA BARBARA, CAL.—The city council has authorized the installation of ornamental light posts and fixtures on Chapala street from Ocean Boulevard to Guterrez street, together with all the appurtenances necessary for construction, completion and operation.

NOGALES, ARIZ.—The Arizona Gas & Elecric Company of Nogales has petitioned the State Corporation Commission for permission to issue $100,000 in bonds, the proceeds to be used to pay for outstanding indebtedness and for an additional generating unit, to cost $30,000.

ORANGE, CAL.—The board of trustees have adopted plans for the installation of an ornamental lighting system on Chapman avenue and Glassell street and the Plaza Square, consisting of 104 ornamental, reinforced concrete electric lighting posts, together with all necessary conduits, globes, foundations and other appurtenances.

LOS ANGELES, CAL.—The city has authorized the quit-claiming to the Standard Oil Company of a portion of the right-of-way to construct, maintain and operate lines of poles and wires for transmission of electrical energy, or telegraphic messages heretofore granted to the city by the Standard Oil Company and not now needed by the city.

BAKERSFIELD, CAL.—The Kern county board of supervisors have accepted the assessment of the Poso irrigation district of some 37,000 acres at the figures submitted by Harry W. McCray of $305,000, and this will be paid in against the indebtedness of $407,000 which is owing to the holders of the bonds, issued in 1888 when the district was organized.

REDLANDS, CAL.—The Pacific Electric will build an extension to Yucaipa just as soon as it is possible and consistent to build it, according to Paul Shoup, president of the railway, in a conference with business men of Redland. The matter of through service from Redlands to Los Angeles and from Los Angeles to Redlands must also wait until after the war, it is stated.

SAN PEDRO, CAL.—Terminal Island will not get the proposed gas mains and service on the line which will be laid off Fish Harbor, as a result of action of engineers and officials of the Southern Counties Gas Company. A route has been selected from the foot of Tenth street and across the channel. The gas company has applied to United States engineers for permit to lay a 3-inch main across the channel.

THE INTER-MOUNTAIN DISTRICT

ELY, NEVADA.—Plans are being considered by the Nevada-California Power Company of Riverside, Cal., for the erection of a high-tension transmission line to Ely, Nev., to cost about $300,000.

COPPERFIELD, NEV.—The Washoe Copper Company of Copperfield is contemplating the erection of a forge shop, engine plant and compressor works at its new plant near the Nixon-Nevada property.

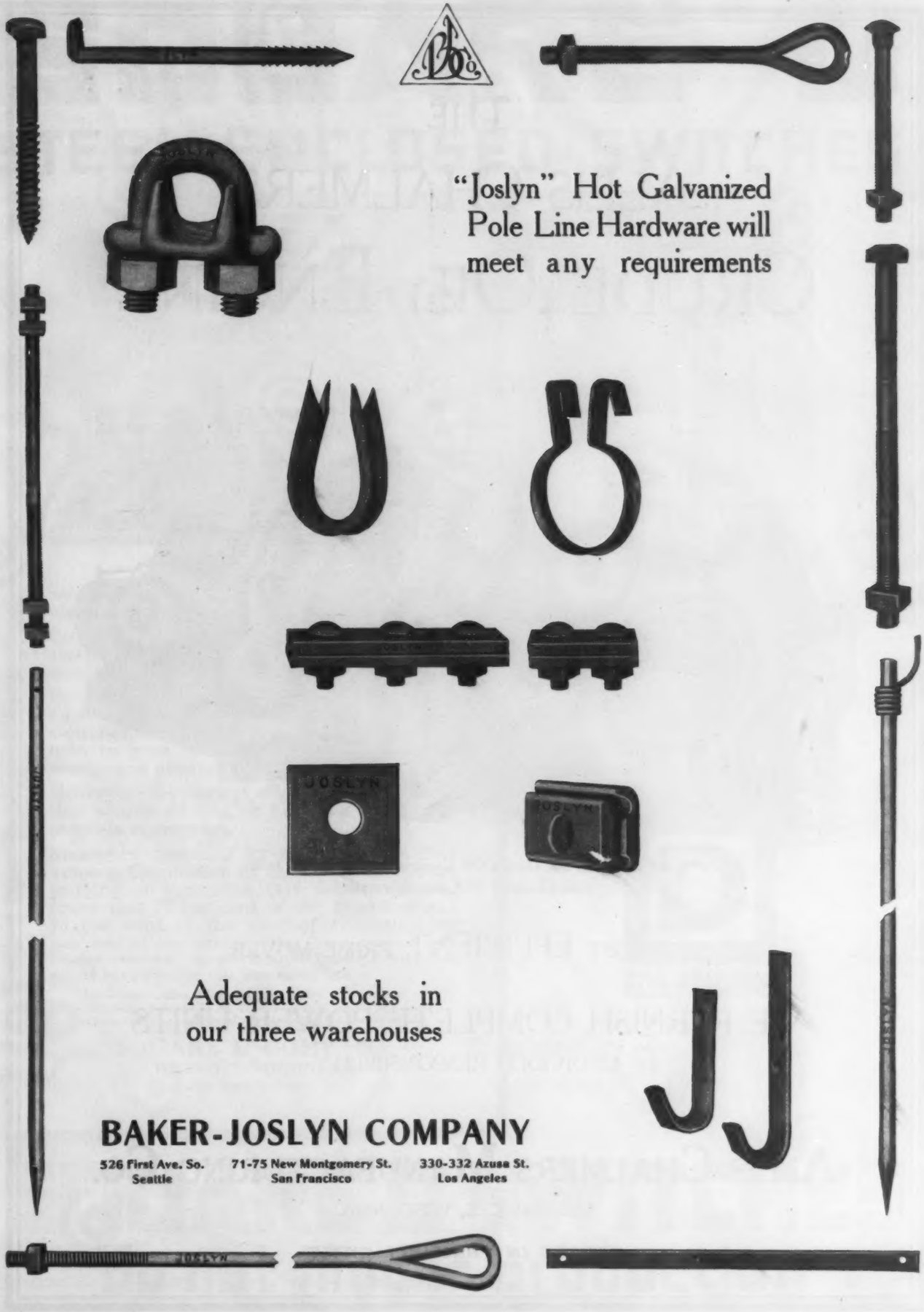
BONNERS FERRY, IDAHO.—The property of the Bonner Water & Light Company has been offered to the city for $80,000. The first offer made through a bonding house several weeks ago was for $125,000.

PROVO, UTAH.—Articles of incorporation of the Palmyra Telephone and Electric Light Company have been filed. The corporation will operate telephone, electric light and power lines. The principal place of business is Spanish Fork.

SANDPOINT, IDAHO.—The Falls Creek Mining Company is contemplating the installation of a power plant to furnish power for its proposed mill and compressor. The plans provide for the construction of a penstock 900 feet long, providing for a fall of 260 feet.

HARLOWTON, MONT.—Work has begun on the installation of electrically driven machinery throughout the entire plant of the Montana Flour Mills Company, to replace steam power. Electricity to operate the mill will be furnished by the Montana Power Company.

GOLDFIELD, NEV.—The Red Hills Florence has taken a long lease on several claims of the Florence Goldfield group. Leases have also been taken on adjacent claims of the Goldfield Consolidated. Arrangements have been made for the building of an electric power line to Gold Mountain, and for the establishment of a camp.



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Adequate stocks in our three warehouses

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THE ALLIS-CHALMERS CRUDE OIL ENGINE

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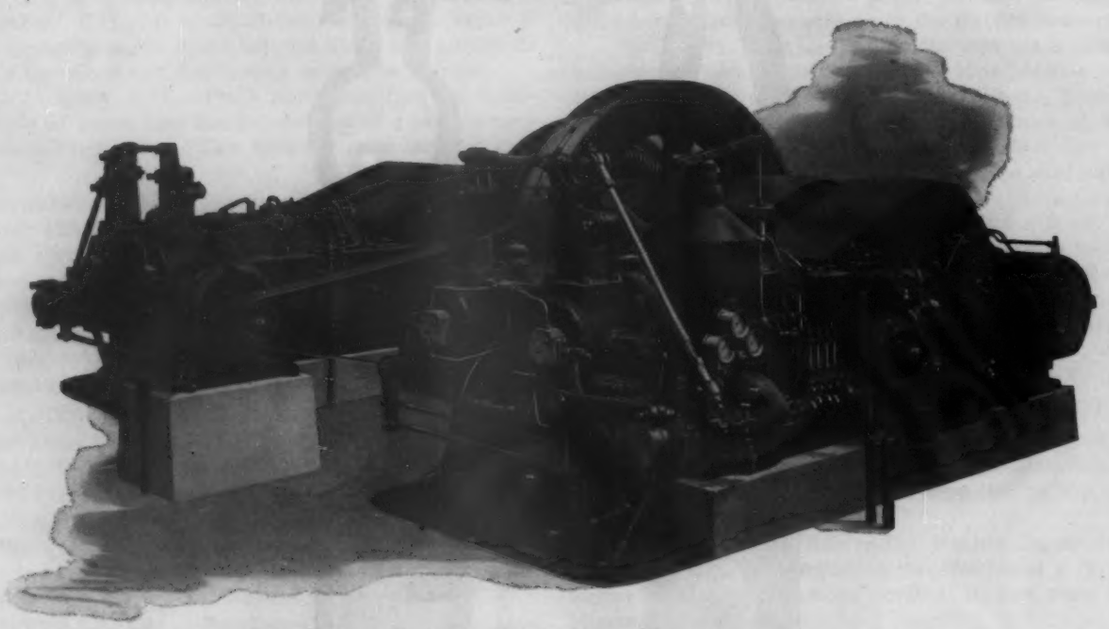

Allis-Chalmers Twin Duplex Oil Engine direct connected to an
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THE MOST EFFICIENT PRIME MOVER

WE FURNISH COMPLETE POWER UNITS

UNDIVIDED RESPONSIBILITY

ALLIS-CHALMERS MANUFACTURING CO.

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SQUARE D

STEEL ENCLOSED SWITCHES

Safe working conditions are a stimulant to production.

Broken morale, shattered confidence and lessened interest in work are the direct result of accidents.

By eliminating the necessity for caution in operating starting switches, it is possible for every man to give full attention to his work—and production is safely speeded.

However, the saving effected by removing this source of loss is but one of several possible economies.

Statistics prepared by the Accident Prevention Committee of the N. E. L. A., reporting on approximately 6,000 accidents, show that 70 per cent of the time lost and 70 per cent of the cost of compensation *was due to accidents resulting from contact with electric current.* Square D Steel Enclosed Switches would have avoided this enormous loss.

Your electrician knows of the many advantages of installing Square D Switches—he will gladly tell you how easily and inexpensively installations can be made.

SQUARE D COMPANY
DETROIT, MICHIGAN
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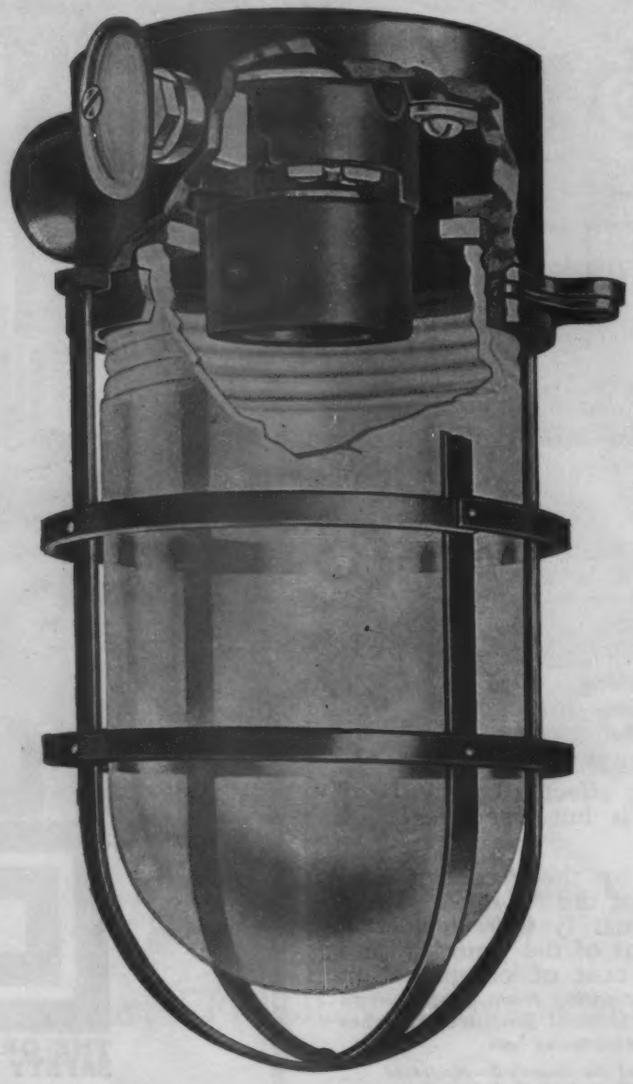
THE ORIGINAL SAFETY SWITCH

SQUARE D SWITCHES

do not hinder production

Steam-Tight Marine Condulets

V and VH Series with Key Socket Attachment



Type V—One of a Complete Series of Condulets for Marine Use—Made in All Combinations and Sizes—Brass or Iron, as Specified

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CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.

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"THOMAS INSULATORS"

The product of the oldest and largest manufacturer of Electrical Porcelain in America

Established 1873

Incorporated 1892

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We bespeak for them the same courteous and cordial treatment which we, ourselves have enjoyed in our past pleasant relations with the trade.

"Thomas Insulators"— for every service and all voltages, will, hereafter, be available on the coast—

AT THE PROPER TIME,
AT A MODERATE PRICE,
AND OF A QUALITY WHICH SPEAKS FOR ITSELF

FACTORIES
East Liverpool, O.
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THE R. THOMAS & SONS CO.

Executive Office:
EAST LIVERPOOL, OHIO, U. S. A.

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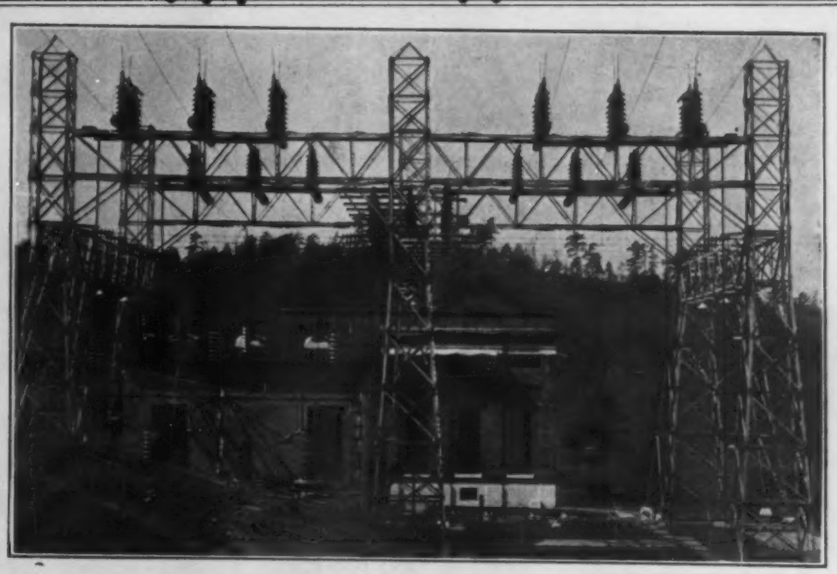

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Incorporated

Pacific Coast Sales Agents

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Canadian Distributors—CANADIAN GENERAL ELECTRIC COMPANY, Limited

Architect
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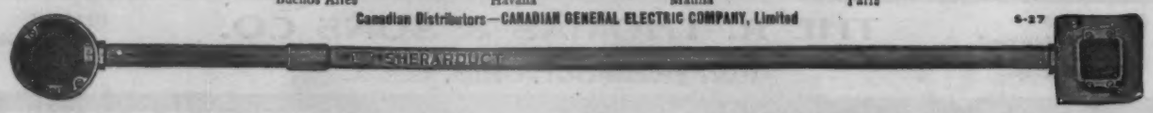

6-27

Some folks have tried to imitate DURADUCT. In doing so they have complimented us, for

"Imitation is the Sincerest Flattery."

But the original in this case is hard to imitate.

It is always best to get the best, so get the original

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THE BLACK DOTTED LINE IS THE MARK OF DURADUCT

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BENJAMIN TWO-WAY PLUG

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Advertisement No. 1 will appear in an early issue of the Saturday Evening Post (2,000,000 circulation); Ad No. 2 will be seen in July Good Housekeeping (500,000); Ad No. 3 will be printed in July Metropolitan (450,000), July Red Book (370,600) and a June issue of Christian Herald (293,661); and Ad No. 4, which is too large to show here, will run in June American Cookery (30,000).

Be sure of a stock of Benjamin Two-Way Plugs, Benjamin No. 2450 Shade Holders and Benjamin Swivel Attachment Plugs sufficient for the demand this advertising will create.

BENJAMIN ELECTRIC MFG. CO.
CHICAGO NEW YORK SAN FRANCISCO

Heat and Light from One Socket
—or power and light—or double the light—with the
BENJAMIN TWO-WAY PLUG
Makes an extra socket always ready for any electrical appliance
At your dealer's $1
Write us for folder
BENJAMIN ELECTRIC MFG. CO
Chicago New York San Francisco
Benjamin No. 2450 Shade Holder enables you to use any shade with your Two-Way Plug.
Also makers of Benjamin Swivel Attachment Plug shown in woman's hand. It screws in without twisting the wire.
Double Value from Your Electricity
Get the full benefit of your electricity. Have an extra lamp wherever you want it. Use your labor-saving appliances wherever you wish—whenever you wish—day or night. The
BENJAMIN TWO-WAY PLUG
fits any socket and gives it two outlets in place of one. It increases the utility of your home electrical appliances and multiplies the comforts of electricity. You need one in every room. Folder on request.
At All Electrical Stores
$1.00
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BENJAMIN ELECTRIC MFG. CO.
Chicago
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Benjamin No. 2450 Shade Holder enables you to use any shade with your Two-Way Plug.
Also manufacturers of the famous Benjamin Swivel Attachment Plug. Screws into the socket without twisting the cord.
Cool Air and Light Too
Get two conveniences from single sockets with the
BENJAMIN TWO-WAY PLUG
Makes electrical appliances handier. Fits any socket.
At Your Dealer's $1.00
Made Only by
BENJAMIN ELECTRIC MFG. CO.
Chicago
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BENJAMIN PRODUCTS

National War Savings Day June 28th

That's the day we sign up.

That's the day we tell Uncle Sam just how hard we want to win this war. That's the day our government has officially set for us to purchase War Saving Stamps.

On June 28th every man, woman and child in the United States will be called upon to pledge his or her full quota of War Savings Stamp purchases for 1918.

You will be expected to pledge the FULL amount that you can afford—no more—but by the same token, no less.

In every state, county, city, town and village the War Savings Committees are preparing for this big patriotic rally of June 28th. Unless you have already bought War Savings Stamps to the $1,000 limit, get busy with paper and pencil and figure out the **utmost** you can do.

Remember this. You take no chances when you go the limit on War Savings Stamps. They are the best and safest investment in the world. They pay you 4% interest compounded quarterly. They **can't** go below par. You can get back every dollar you put into War Savings Stamps **any time you need it.** You can turn them in at the Post Office **any time** for their full value plus interest.

Uncle Sam is asking hundreds of thousands of men to **give** their lives to their country. He is asking you only to **lend** your money.

What are **you** lending?

National War Savings Committee, Washington

W.S.S. WAR SAVINGS STAMPS ISSUED BY THE UNITED STATES GOVERNMENT

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One of the "WIN THE WAR" Installations on the Pacific Coast

How You Can Help Make This a Record Year

You will find Storage Battery Industrial Trucks and Tractors relieving man shortage in—

SHIP YARDS FOUNDRIES CANNERIES
FLOUR MILLS LUMBER MILLS PAPER MILLS
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—and OTHER INDUSTRIAL PLANTS

To make this a record year and win the war it is necessary to release man power, and substitute mechanical means wherever possible. Any machine that will release 5 to 15 men for more important work merits investigation.

Electric Trucks and Tractors

Operated by

Edison Storage Batteries

are daily demonstrating their efficiency. NINETY PER CENT of the industrial trucks and tractors on the Pacific Coast are equipped with EDISON STORAGE BATTERIES.

Only batteries built of steel will "stand up" under severe use, abuse, bumps, jolts, etc., and that is why it is customary to specify Edison batteries (the only battery built of steel.)

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Factory and Main Office: Orange, N. J.

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THE reproduction above shows the damage resulting from pulling out the terminal connectors of electric irons, toasters and other appliances.

The use of appliances is thus discouraged, the flashes at the posts even frightening some women from further use of them.

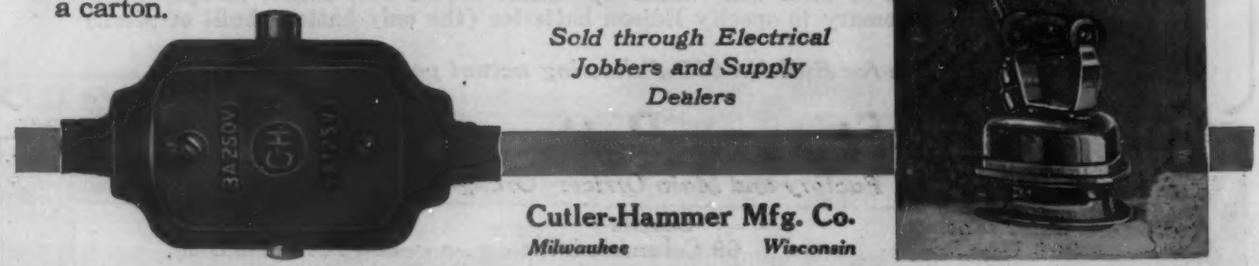
This is now being avoided through the use of the

C-H Seventy Fifty SWITCHES

which has had a steady sale by those handling electrical appliances. They are packed in easel-stand display cartons—10 in a carton.

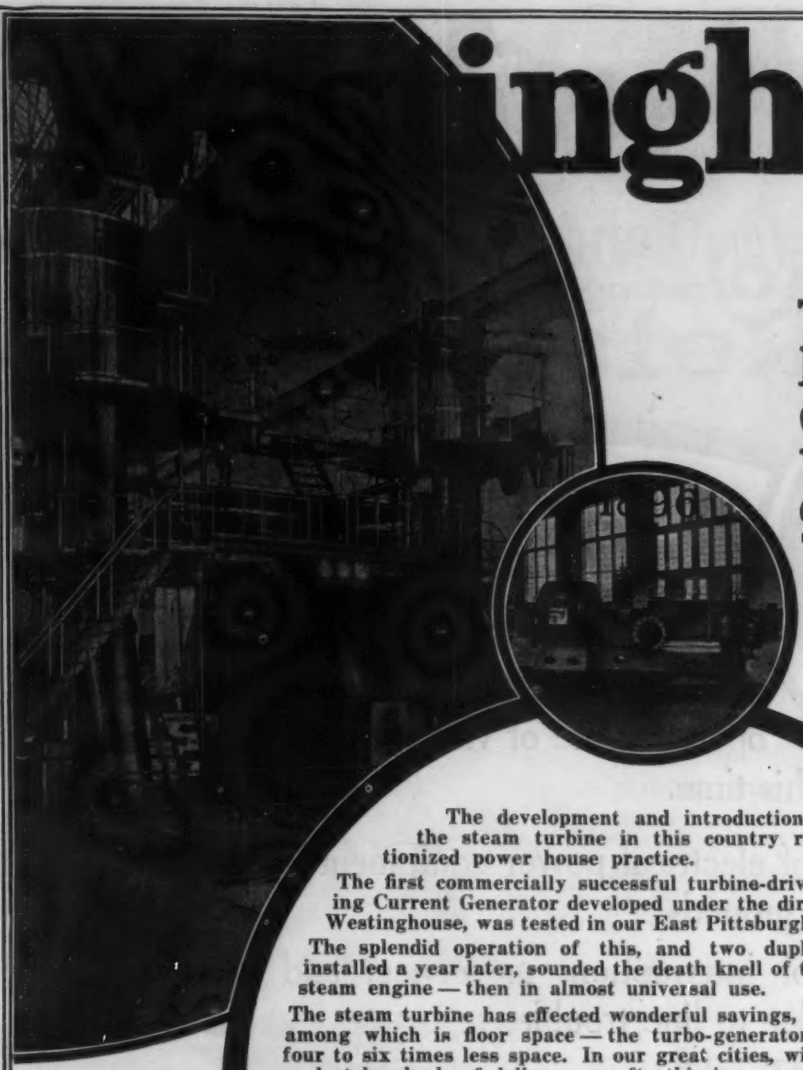
Sold through Electrical Jobbers and Supply Dealers

The Remedy



Cutler-Hammer Mfg. Co.
Milwaukee *Wisconsin*

inghouse



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The development and introduction of the steam turbine in this country revolutionized power house practice.

The first commercially successful turbine-driven Alternating Current Generator developed under the direction of Geo. Westinghouse, was tested in our East Pittsburgh shops in 1896.

The splendid operation of this, and two duplicate machines installed a year later, sounded the death knell of the reciprocating steam engine — then in almost universal use.

The steam turbine has effected wonderful savings, the most evident among which is floor space — the turbo-generator occupying from four to six times less space. In our great cities, with floor space valued at hundreds of dollars a sq. ft., this is a consideration of great importance.

Ever since its organization, Westinghouse Electric has been foremost in the development of steam and electrical apparatus.

Westinghouse Electric & Manufacturing Co.
EAST PITTSBURGH, PA.

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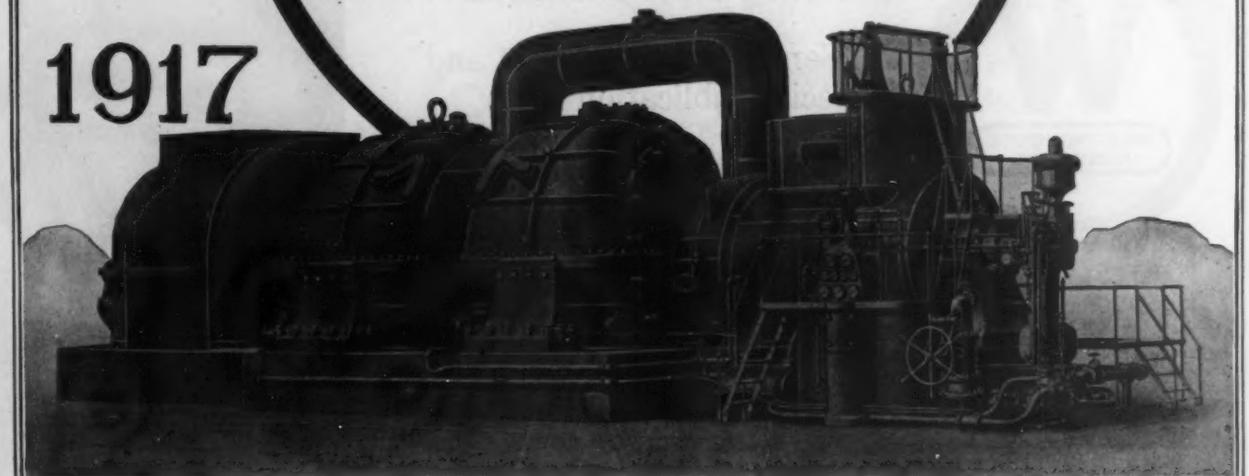
PACIFIC COAST DISTRIBUTORS: Electric Ry. & Mfrs. Supply Co., San Francisco; Illinois Electric Co., Los Angeles; Fobes Supply Co., Portland and Seattle; The Washington Electric Supply Co., Spokane.

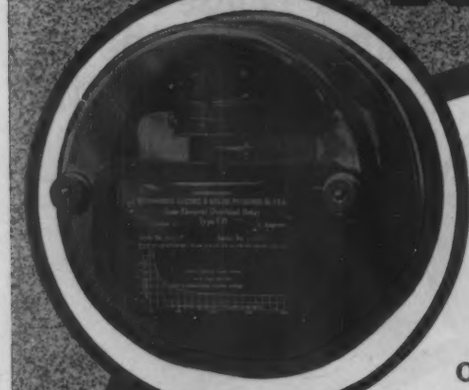
1917



Westinghouse

Type CO (Overload) and Type CR (Reverse Power) Alternating-Current Relays

Insure Continuous Service



Type CO Relay

Factors in War Production

Three features in central station operation are of vital importance at this time.

1. Protection of electrical power equipment from short circuits and grounds.
2. Prevention of interruptions in service, and costly shutdowns due to line trouble.
3. Efficient loading of transmission lines and distribution feeders.

Types CO and CR relays are the most accurate and reliable means known of meeting these conditions.

Send for Leaflet 3974 and special publication 1572.

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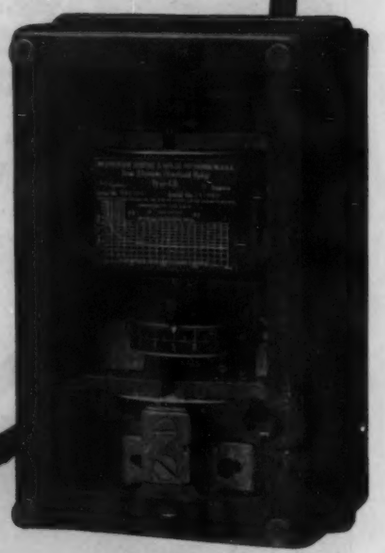

Type CR Relay

Westinghouse Electric & Manufacturing Company

East Pittsburgh, Pa.

San Francisco, 1 Montgomery St. Los Angeles, 7th and Spring Sts.

PACIFIC COAST DISTRIBUTORS:

Electric Ry. & Mfrs. Supply Co., San Francisco
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Illinois Electric Co., Los Angeles
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The best UNIVERSAL advertising is the satisfaction delivered by the goods themselves.

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Hubbard & Company
Pacific States Electric Company

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Hubbard & Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

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V.V. Fittings Company
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National Carbon Company, Inc.
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Electric Storage Battery Co.
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Pacific States Electric Company
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Pacific States Electric Company
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Pacific Coast Branch: 701-702 Rialto Bldg., San Francisco

WHERE TO BUY

CLASSIFIED INDEX TO ADVERTISERS

Line Material, Pole
Baker-Joslyn Company
General Electric Company
Hubbard & Company
Locke Insulator Mfg. Company
Pacific States Electric Company
Thomas & Sons Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Line Material, Railway
Baker-Joslyn Company
General Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Machinery, Mining
Allis-Chalmers Mfg. Company

Magnets, Lifting
Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.

Meters, Ammeter & Volt
General Electric Company
National Carbon Company
Roller-Smith Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Meters, Watthour
General Electric Company
Roller-Smith Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Molding, Metal
American Conduit Mfg. Company
National Metal Molding Company
Western Electric Company

Molding, Wood
Pacific States Electric Company
Western Electric Company

Motors, A.C.
Allis-Chalmers Mfg. Company
Century Electric Company
Crocker-Wheeler Company
General Electric Company
Garland-Affolter Eng. Company
Howell Electric Motors Company
Peerless Electric Company
Sprague Electric Works
Wagner Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Motors, D.C.
Allis-Chalmers Mfg. Company
Crocker-Wheeler Company
General Electric Company
Garland-A olter Eng. Company
Manhattan Electrical Supply Co.
Peerless Electric Company
Sprague Electric Works
Wagner Electric Mfg. Company
Western Electric Company
Western Electric Company

Motor Generators
General Electric Company
Garland-Affolter Eng. Company
Peerless Electric Company
Sprague Electric Works
Wagner Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Motor Protectors
General Electric Company

Motor Starters, A.C. and D.C.
Crocker-Wheeler Company
Cutler-Hammer Company
General Electric Company
Electric Controller & Mfg. Co.
Garland-Affolter Eng. Company
Wagner Electric Mfg. Company
Wells-Morris Mfg. Company
Western Electric Company
Ward-Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Novelties, Electric
American Ever-Ready Works
Manhattan Electrical Supply Co.
Western Electric Company

Oil Burners and Systems
Assoc. Eng. & Supply Company
Moore & Company, Chas. C.

Ozonators
Pacific States Electric Company
Sprague Electric Works

Paint, Insulating
Baker-Joslyn Company
General Electric Company
Pacific States Electric Company
Westinghouse Electric & Mfg. Co.

Paints, Preservative
Baker-Joslyn Company
Nason & Company
Pacific States Electric Company

Panel Board Slate
Davis Slate & Mfg. Company

Panel Boards
Benjamin Electric Mfg. Company
Crouse-Hinds Company
General Electric Company
Pacific States Electric Company
Sprague Electric Works
Western Electric Company
Westinghouse Electric & Mfg. Co.

Panels, Motor Starting
Condit Electrical Mfg. Company
General Electric Company
Pacific States Electric Company
Western Electric Company
Ward-Leonard Company
Westinghouse Electric & Mfg. Co.

Pins, Eucalyptus and Locust
Baker-Joslyn Company
Locke Insulator Mfg. Company
Pacific States Electric Company
Western Electric Company

Pins, Iron and Steel
Baker-Joslyn Company
Hubbard & Company
Locke Insulator Mfg. Company
Pacific States Electric Company
Thomas & Sons Company
Western Electric Company

Pipe Specials
American Conduit Mfg. Company
National Metal Molding Company
Pittsburgh Piping & Equip. Co.

Piping Installations
Pittsburgh Piping & Equip. Co.

Plates, Flush Switch
Cutler-Hammer Mfg. Company
General Electric Company
Pacific States Electric Company
Western Electric Company

Plugs, Attachment
Benjamin Electric Mfg. Company
Condit Electric Mfg. Company
Crouse-Hinds Company
Cutler-Hammer Mfg. Company
Edison Electric Appliance Co.
General Electric Company
Manhattan Electrical Supply Co.
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Plugs, Flush
General Electric Company
Manhattan Electrical Supply Co.
Pacific States Electric Company
Western Electric Company

Plugs, Stage
General Electric Company
Pacific States Electirc Company
Western Electric Company

Pole Line Hardware
Baker-Joslyn Company
Hubbard & Company
Locke Insulator Mfg. Company
Pacific States Electric Company
Thomas & Sons Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Pole, Iron and Steel
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Pole, Wood
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Porcelain Specialties
General Electric Company
Locke Insulator Mfg. Company
Thomas & Sons Company

Portables, Electric
Faries Mfg. Company
Pacific States Electric Company
Western Electric Company

Power Plant Piping
Moore & Company, Chas. C.
Pittsburgh Piping & Equip. Co.

Power Plants
Allis-Chalmers Mfg. Company
General Electric Company
Moore & Company, Chas. C.
Western Electric Company
Westinghouse Electric & Mfg. Co.

Projectors, Electric
Crouse-Hinds Company
General Electric Company
National X-Ray Reflector Co.
Western Electric Company

Pumps, Condenser
Westinghouse Electric & Mfg. Co.

Pumps, Centrifugal
Moore & Company, Chas. C.
Westinghouse Electric & Mfg. Co.

Push Buttons
Benjamin Electric Mfg. Company
General Electric Company
Manhattan Electrical Supply Co.

WHERE TO BUY

CLASSIFIED INDEX TO ADVERTISERS

Pacific States Electric Company
Western Electric Company

Radiators, Electric
American Electrical Heater Co.
Cutler-Hammer Company
Edison Electric Appliance Co.
General Electric Company
Landers, Frary & Clark
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Rail Bonds
General Electric Company
Westinghouse Electric & Mfg. Co.

Ranges, Electric
American Electrical Heater Co.
Edison Electric Appliance Co.
Federal Sign System (Electric)
General Electric Company
Landers, Frary & Clark
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Rectifiers
General Electric Company
Pacific States Electric Company
Wagner Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Reflectors
Benjamin Electric Mfg. Company
Faries Mfg. Company
General Electric Company
National X-Ray Reflector Co.
Pacific States Electric Company
Western Electric Company

Regulators, Boiler Feed
Moore & Company, Chas. C.

Regulators, Voltage
General Electric Company
Western Electric Company
Ward-Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Relays
Condit Electric Mfg. Company

Resistance Units
Cutler-Hammer Mfg. Company
General Electric Company
Western Electric Company
Ward-Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Resistances
Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.
General Electric Company
Western Electric Company
Ward-Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Rheostats
Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.
General Electric Company
Garland-Affolter Eng. Company
Pacific States Electric Company
Western Electric Company
Ward-Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Rods, Copper, Brass, Bronze
Standard Underground Cable Co.

Rosettes
Crouse-Hinds Company
General Electric Company
Pacific States Electric Company

Searchlights
General Electric Company
Pacific States Electric Company
Western Electric Company

Shades
Benjamin Electric Mfg. Company
Faries Mfg. Company
National X-Ray Reflector Co.
Western Electric Company

Signs, Electric
Federal Sign System (Electric)
Novelty Electric Sign Company

Slate
Davis Slate & Mfg. Company

Sockets and Receptacles
Benjamin Electric Mfg. Company
Cutler-Hammer Mfg. Company
Crouse-Hinds Company
Federal Sign System (Electric)
General Electric Company
Pacific States Electric Company
Pass & Seymour
V.V. Fittings Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Solder, Self Fluxing
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Soldering Paste
Baker-Joslyn Company
Benjamin Electric Mfg. Company
Pacific States Electric Company
Western Electric Company

Staples, Insulating
Pacific States Electric Company
Western Electric Company

Starters (Self), D.C. and A.C.
Condit Electric Mfg. Company
Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.
Garland-Affolter Eng. Company
General Electric Company
Pacific States Electric Company
Western Electric Company
Ward-Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Starters (Hand), D.C. and A.C.
Condit Electrical Mfg. Company
Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.
General Electric Company
Pacific States Electric Company
Wagner Electric Mfg. Company
Ward-Leonard Electric Company
Wells-Morris Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Strand (Galvanized)
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Supplies, Electrical
Baker-Joslyn Company
Benjamin Electric Mfg. Company
General Electric Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Switch Boxes
Baker-Joslyn Company
Crouse-Hinds Company
General Electric Company
Pacific States Electric Company
Sprague Electric Works
Square D Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Switch Lugs
General Electric Company
Pacific States Elecrtic Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Switches, Float
Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.
General Electric Company
Pacific States Electric Company
Westinghouse Electric & Mfg. Co.

Switches, Float
Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.
General Electric Company
Pacific States Electric Company
Westinghouse Electric & Mfg. Co.

Switches, Disconnecting
Garland-Affolter Eng. Company
General Electric Company
Pacific States Electric Company
Square D Company
Westinghouse Electric & Mfg. Co.

Switches, High Tension
General Electric Company
Pacific States Electric Company
Westinghouse Electric & Mfg. Co.

Switches, Knife
Baker-Joslyn Company
Condit Electrical Mfg. Co.
Crouse-Hinds Company
Electric Controller & Mfg. Co.
General Electric Company
Manhattan Electrical Supply Co.
Pacific States Electric Company
Square D Company
Westinghouse Electric & Mfg. Co.

Switches, Oil
Allis-Chalmers Mfg. Company
Condit Electrical Mfg. Company
Crocker-Wheeler Company
General Electric Company
Pacific States Electric Company
Westinghouse Electric & Mfg. Co.

Switches, Pendent
Benjamin Electric Mfg. Co.
Cutler-Hammer Mfg. Company
General Electric Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Electrical Slate

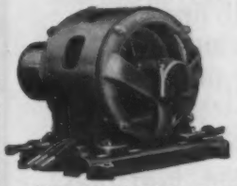
PENRHYN PURPLE
PENRHYN MONSONIZED
IMPERIAL BLACK
MONSON BLACK

Our Price List No. 6, quotes Prices per Slab and Gives Much Valuable Information

DAVIS SLATE & MANUFACTURING Co.
CHICAGO
Factories: Chicago, Ill., Muskegon, Mich.

CROCKER-WHEELER
LIKE THE PYRAMIDS BUILT TO LAST
ELECTRIC MOTORS

RUGGED AND ECONOMICAL



This C-W Form Q-A.C. squirrel-cage induction motor is built for economical operation. It combines simplicity of design, reliability and ruggedness with low upkeep cost and good operating characteristics.

A large stock on hand in both San Francisco and Los Angeles for immediate delivery. ½ to 75 H.P.

Bulletin 180-A describes it in detail. Write for Bulletin.

CROCKER-WHEELER COMPANY,
87 New Montgomery St., San Francisco — Tel. Sutter 2076
Smith-Booth-Usher Co., Los Angeles, distributors of C-W apparatus in Southern Cal., Arizona and New Mexico

You Can Depend
upon the durability and economy of STANDARD Weatherproof Wires and Cables because they have been tested by over 30 years of service.

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Standard Underground Cable Co.
Pacific Coast Dept., San Francisco, Cal.
Los Angeles, Salt Lake City; Seattle
For Canada: Standard Underground Cable Co. of Canada, Limited, Hamilton, Ont.

WEATHER PROOF TRADE MARK "O.K." LINE AND HOUSE WIRES

RED CORE TRADE "PARAC" MARK RUBBER WIRES

PHILLIPS WIRE CO.
Pawtucket, R. I.
Bare and Insulated Wires
Carried in Stock on Pacific Coast

Western Electric Co. Seattle
Electric Appliance Co. San Francisco
Western Electric Co. Los Angeles

Push the "Home Electrical" Idea

AS a feature of the home, electrical equipment is rapidly increasing in practical importance and popular interest.

The central station man and engineer who is keeping in touch with progressive practice in this phase of home planning will find much helpful material in the manual that we have prepared as a part of the Habirshaw service to the electrical trade.

The data contained in this portfolio has been compiled from the most reliable sources, representing the best modern practice. It is intended to answer many of the questions that may arise in considering home electrical equipment, and to provide basic suggestions for making up electrical budgets.

Copies of "Plans and Specifications for the Home Electrical" will be supplied without charge.

For more than 30 years, practically from the beginning of the electrical industry

HABIRSHAW

"Proven by the test of time"

Insulated Wire

has been accepted as a standard of quality all over the world.

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Code Wire Distributed by

Western Electric Company

Offices in all principal cities

WHERE TO BUY

CLASSIFIED INDEX TO ADVERTISERS

Switches, Push Button
Edison Electric Appliance Co.
General Electric Company
Pacific States Electric Company
Western Electric Company
Manhattan Electrical Supply Co.

Switches, Snap
Cutler-Hammer Mfg. Company
General Electric Co.
Manhattan Electrical Supply Co.
Pacific States Electric Company
Western Electric Company

Switches, Solenoid
Cutler-Hammer Mfg. Company
General Electric Company
Pacific States Electric Company

Switches, Pole-Top
Condit Electrical Mfg. Company
General Electric Company
Pacific States Electric Company
Western Electric Company

Switchboard Slate
Davis Slate & Mfg. Company

Switchboards, Power and Lighting
Allis-Chalmers Mfg. Co.
Crouse-Hinds Company
Electric Storage Battery Co.
Pacific States Electric Company
Sprague Electric Works
Western Electric Company
Westinghouse Electric & Mfg. Co.

Switchboards, Telephone
Western Electric Company

Tape
Baker-Joslyn Company
Freydberg Bros.
General Electric Company
New York Insulated Wire Co.
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Telephone Equipment
Pacific States Electric Company
Western Electric Company

Terminals
General Electric Company
Pacific States Electric Company
Standard Underground Cable Co.
Wagner Electric Mfg. Company
Westinghouse Electric & Mfg. Co.

Tester, Fuse and Circuit
Electric Service Auto Company

Tools, Construction
Baker-Joslyn Company
Hubbard & Company
Pacific States Electric Company
Western Electric Company

Towers, Steel
Pacific States Electric Company
Pierson, Roeding & Co.

Transformers
Allis-Chalmers Mfg. Company
Condit Electric Mfg. Company
Crocker-Wheeler Company
General Electric Company
Moloney Electric Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Trolley Line Material
General Electric Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Tubes, Copper and Brass
Standard Underground Cable Co.

Tubing, Flexible Non-Metallic
American Conduit Mfg. Company
Tubular Woven Mfg. Company

Turbines, Steam
Allis-Chalmers Mfg. Company
General Electric Company
Westinghouse Electric & Mfg. Co.

Turbines, Water
Allis-Chalmers Mfg. Company
Pittsburgh Piping & Equip. Co.

Vacuum Cleaners, Electric
American Ever-Ready Works
Edison Electric Appliance Co.
Federal Sign System (Electric)
Hurley Machine Company
Pacific States Electric Company
Western Electric Company

Washing Machines
Federal Sign System (Electric)
Hurley Machine Company
Pacific States Electric Company
Western Electric Company

Water Heaters, Electric
General Electric Company
Edison Electric Appliance Co.
Landers, Frary & Clark
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Wire, Aluminum
Pacific States Electric Company
Western Electric Company

Wire, Annunciating and Office
Pacific States Electric Company
Phillips Wire Company
Standard Underground Cable Co.
Western Electric Company

Wire, Armored
Baker-Joslyn Company
Detroit Insulated Wire Company
General Electric Company
Habirshaw Electric Cable Co. Inc.
Pacific States Electric Company
Sprague Electric Works
Standard Underground Cable Co.
Western Electric Company
Youngstown Sheet & Tube Co.

Wire, Asbestos-Covered
Baker-Joslyn Company
General Electric Company
Pacific States Electric Company
Western Electric Company

Wire, Bare Copper
Baker-Joslyn Company
General Electric Company
Pacific States Electric Company
Phillips Wire Company
Standard Underground Cable Co.
Western Electric Company

Wire, Copper Clad
Standard Underground Cable Co.

Wire, Enameled
General Electric Company
Pacific States Electric Company
Western Electric Company
Youngstown Sheet & Tube Co.

Wire, Galvanized and Strand
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Wire, Magnet
Baker-Joslyn Company
General Electric Company
Pacific States Electric Company
Standard Underground Cable Co.
Western Electric Company

Wire, Rubber-Covered
Baker-Joslyn Company
Detroit Insulated Wire Company
General Electric Company
Habirshaw Electric Cable Co.,Inc.
New York Insulated Wire Co.
Okonite Company
Pacific States Electric Company
Phillips Wire Company
Standard Underground Cable Co.
Western Electric Company

Wire, Telephone
Baker-Joslyn Company
Detroit Insulated Wire Company
Habirshaw Electric Cable Co.,Inc.
Okonite Company
Pacific States Electric Company
Standard Underground Cable Co.
Western Electric Company
Youngstown Sheet & Tube Co.

Wire, Trolley
Baker-Joslyn Company
General Electric Company
Pacific States Electric Company
Phillips Wire Company
Standard Underground Cable Co.
Western Electric Company

Wire, Weatherproof
Baker-Joslyn Company
General Electric Company
Manhattan Electrical Supply Co.
New York Insulated Wire Co.
Okonite Company
Pacific States Electric Company
Phillips Wire Company
Standard Underground Cable Co.
Western Electric Company

NATIONAL WAR SAVINGS DAY JUNE 28th

Ad-itorial Comment

(Don't expect the public to remember your business too long without assistance. The public has a lot of other important things on its mind. Conserving man power is the order of the day and the number of travelling salesmen who formerly kept the buyer posted is greatly reduced, hence he naturally turns to his favorite journal for the information. The value of advertising under present conditions is therefore greater than ever before.—The Ad-itor.)

Edison Electric Appliance Co., Hot Point Division, calls attention to the comprehensive manner in which it is assisting its distributors through nation-wide publicity and urges that Hot Point distributors take full advantage of their popular advertising campaign.

Condit Electrical Mfg. Co. describes its Type D-12 Oil Switch or Circuit Breaker as listed in Bulletin No. 418.

Baker-Joslyn Company illustrates the "Joslyn" pole line hardware for construction work.

Allis-Chalmers Mfg. Co. advertises crude oil engines of the Diesel type and calls attention to its ability to furnish complete power units for electrical service.

Square D Company calls attention to the value of steel enclosed switches in providing safe working conditions, thereby increasing labor efficiency and eliminating possibility of accidents.

The R. Thomas & Sons Company announce the appointment of the Western Electric Company, Inc., as exclusive sales agents for "Thomas Quality" Insulators on the Pacific Coast, and bespeak for them the same cordial treatment as formerly extended to themselves.

National Metal Molding Company calls attention to the San Francisco Public Library as one of many fine buildings in which Sheraduct is used exclusively.

Benjamin Electric Manufacturing Company calls attention to its national popular advertising campaign on Benjamin two-way plugs, and asks that distributors be prepared to meet the demand resulting therefrom.

National War Savings Day June 28th. Do not fail to make your pledge.

Edison Storage Battery Supply Company suggests a way to increase the efficiency of your plant and at the same time serve the Government.

Cutler-Hammer Manufacturing Company cleverly illustrates how the use of C. H. Switches eliminate the many serious disadvantages incident to depending upon the connecting plug for cutting the current on or off household appliances.

Westinghouse Electric and Manufacturing Company calls attention to the revolution in power house practice brought about by the introduction of the steam turbine, also the importance of protecting electric service used for production of war material by the use of Type CO or CR relays.

The Philadelphia Electric Company Supply Department advertises Franklin Bus Bar Supports which have many unique features.

National Carbon Company, Inc. calls attention to its line of carbon brushes and carbon for all purposes.

The Youngstown Sheet & Tube Company suggests the economy of using Buckeye conduit and Realflex armored cable.

Chicago Fuse Manufacturing Company offers the "Union" renewable fuse as having fewer parts and great durability combined with accurate rating.

Sprague Electric Works of the G. E. Co. calls attention to its special hot galvanizing process for galvanizing Greenfield duct which adds greatly to its lasting qualities.

The Robbins & Myers Company is conducting an advertising campaign in leading magazines which is proving of great assistance to distributors.

The Habirshaw Electric Cable Company announces a new manual offered to the electrical trade as a part of Habirshaw service. This manual contains data on best modern practice and answers many questions arising in connection with home equipment.

Century Electric Company illustrates its 9-inch A.C. fans.

The American Conduit Manufacturing Company presents further convincing arguments in favor of Wiremold, with new thoughts to further the sale of household appliances.

Hubbard & Company advertises an excellent line of low tension insulator brackets.

Pacific States Electric Company offers the services of specialists on electric transmission line material.

Hurley Machine Company calls attention to increased manufacturing facilities which further guarantees "Hurley service" to its dealers and users of Thor apparatus.

General Electric Company calls attention to pendent and ceiling switches for use with household devices. How to secure better work by furnishing pure air to employes.

American Vulcanized Fibre Company describes Vul-Cot Fibre and its adaptability to a wide range of insulating and mechanical uses.

Landers, Frary & Clark calls attention to its national advertising campaign and suggests that dealers tie in by displaying the life size nine-color cutout which can be obtained on request.

Use VUL-COT FIBRE a higher development of vulcanized cotton fibre

for washers

VUL-COT FIBRE is practicularly well suited for the making of insulating washers because it has high non-conductive powers, is hard and tough without being brittle and withstands severe service.

Vul-Cot Fibre can be machined to practically any required shape, from tiny washers for the most delicate electrical instruments to heavy, tapped washers for large motors. The thinner sizes can be stamped on high speed machines.

Although millions of Vul-Cot Fibre washers are used, this is but one of the many forms in which this adaptable material is applied. In every electrical plant there are many places where this serviceable material can be used economically.

Sold in sheets, rods and tubes. Special parts machined to your order.

Write for samples and full particulars.

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NEW YORK PITTSBURGH DETROIT ST LOUIS
Complete Stock for Immediate Shipment at Chicago
Western Agents
Western Electric Company
SAN FRANCISCO PORTLAND SEATTLE OAKLAND LOS ANGELES
Canadian Agents
Northern Electric Company LIMITED
MONTREAL OTTAWA REGINA TORONTO HALIFAX WINNIPEG CALGARY VANCOUVER

Ready Reference for Western Buyers

ELECTRICAL SUPPLIES AUTOMOBILE

Electric Appliance Company

SAN FRANCISCO

LOS ANGELES PORTLAND SPOKANE
OAKLAND SAN FRANCISCO SEATTLE

PACIFIC STATES ELECTRIC CO.

DISTRIBUTORS FOR

General Electric Company
Sprague Electric Works
Locke Insulator Mfg. Company
Hubbard & Company
Hemingray Glass Company
The American Conduit Mfg. Co.
Hurley Machine Company
Crouse-Hinds Company
Ivanhoe Regent Works
Union Metal Mfg. Company
Landers, Frary & Clark
L. Plaut & Company

SAN FRANCISCO SEATTLE
LOS ANGELES PORTLAND

GARNETT YOUNG and COMPANY

Pacific Coast sales agents for
ELECTRICAL MANUFACTURERS of
QUALITY PRODUCTS

Famous Brands

Holabird Electrical Co.
SAN FRANCISCO

Jobbers of Electrical Supplies

Distributors of
CENTRAL TUBE CO.—Conduit
CHASE-SHAWMUT CO.—Fuses
FRANKLIN MAZDA LAMPS

Hotpoint Appliances
Ohio Brass Co.

Los Angeles Seattle San Francisco

H. B. Squires Company

Representing
Alphaduct Company
Condit Electrical Mfg. Company
Cutler-Hammer Mfg. Co.
Dossert & Co.
Geo. Cutter Co.
L. B. Allen Co., Inc.
Mathias Klein & Sons
National India Rubber Co.
Stanley & Patterson
Thomas & Betts Co.

Los Angeles
Chicago

Illinois Electric Co.
JOBBERS
Electrical Supplies

Distributors of

THE ORIGINAL SAFETY SWITCH

AGENTS FOR WESTINGHOUSE ELEC. & MFG. CO.

ELECTRIC RAILWAY & MANUFACTURERS SUPPLY CO.

Jobbers and Manufacturers of Electrical Supplies

Specialists in
Knife Switches
Panel Boards
Switchboards and
Insulating Materials

AGENTS FOR WESTINGHOUSE ELEC. & MFG. CO.

SAN FRANCISCO

NATIONAL CARBON CO.
[INC.]

EVEREADY AND COLUMBIA PRODUCTS

S. E. CORNER EIGHTH AND BRANNAN STS.

SAN FRANCISCO, CAL.

PELTON

WATER WHEELS

TURBINE AND IMPULSE

THE PELTON WATER WHEEL CO.
SAN FRANCISCO ; : : NEW YORK

TRADE MARK
HEMINGRAY
REGISTERED.

STANDARD GLASS INSULATORS

ELECTRIC AGENCIES CO.
(Inc.)

283 MINNA ST., SAN FRANCISCO
340 AZUSA ST., LOS ANGELES
1252 FIRST AVE. So., SEATTLE

PACIFIC COAST REPRESENTATIVES OF—

National Electric Utilities Co.
Ranges
Youngstown Sheet & Tube Co.
Conduits
E. H. Freeman Electric Co.
Sockets and Wiring Devices
Lincoln Electric Co.
Motors
Illinois Wire & Cable Co.
Wire Cable
Chelten Electric Co.
Switches and Boxes

Buyers

can well afford to patronize those registered on these pages as it is evidence of mutual co-operation in the upbuilding of the West.

Ready Reference for Western Buyers

J. G. POMEROY
833 San Fernando Bldg.
LOS ANGELES, CAL.

REPRESENTING
ROME WIRE CO.
Rubber Covered Magnet and Bare Copper Wire

M. B. AUSTIN & CO.
Outlet Boxes, Lock Nuts and Bushings

McGILL MFG. CO.
Lamp Guards

THE SUNLIGHT ELECTRIC CO.
Carbon Incandescent Lamps

ALUMINUM COMPANY OF AMERICA
PITTSBURGH, PA.
Manufacturers of Aluminum Ingot, Sheet, Tubing, Wire, Rod, Rivets, Moulding, Extruded Shapes, Electrical Conductors.
GENERAL SALES OFFICE, 2400 Oliver Bldg., Pittsburgh, Pa.
BRANCH OFFICES: Boston, 131 State St.; Chicago, 1500 Westminster Bldg.; Cleveland, 950 Leader-News Bldg.; Detroit, 1512 Ford Bldg.; Kansas City, 306 R. A. Long Bldg.; New York, 120 Broadway; Philadelphia, 1216-1218 Widener Bldg.; Rochester, 1112 Granite Bldg.; San Francisco, 731 Rialto Bldg.; Washington, 509 Metropolitan Bank Bldg. Canada: Northern Aluminum Co., Ltd., Toronto. England: Northern Aluminum Co., Ltd., London. Latin America: Aluminum Co. of South America, Pittsburg, Pa.
Send inquiries regarding aluminum in any form to nearest Branch Office or to General Sales Office

THE ELECTRIC MATERIAL CO.
589 Howard St., San Francisco
REPRESENTING
G. & W. ELECTRIC SPECIALTY CO.
Cable Potheads Switching Boxes
WARD LEONARD ELECTRIC CO.
Rheostats Resistance Units
ROLLER-SMITH CO.
Instruments Circuit Breakers
WACLARK WIRE CO.
Bare and Weatherproof Wire and Cable
BATES EXPANDED STEEL TRUSS CO.
Steel Poles for Transmission Lines
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PANAMA LAMP & COMMERCIAL COMPANY
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Expert investigators of electrochemical and electrometallurgical loads for power developments, including every stage in the design and construction of both power and chemical plants. Research work undertaken.
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EASTWOOD MULTIPLE ARCH TYPE
Suitable for any height or site.
Cheaper than earth dams.
Stronger than solid masonry.
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Federal Electric Signs

are the best buy for your customer

They are distinctive,—

brilliant by day and night;
need no painting or repairing;
will not rust, rot, corrode or fade.

This Federal Commands the busiest corner of the WEST—3rd and Market Sts., San Francisco

16 in. and 24 in. porcelain enamel steel with red Porcelain novelty effects

Electric Signs were drafted to sell Liberty Bonds. "Lightless Nights" were discontinued in the East at the request of the Liberty Loan Committee. With this government endorsement, you can sell signs.

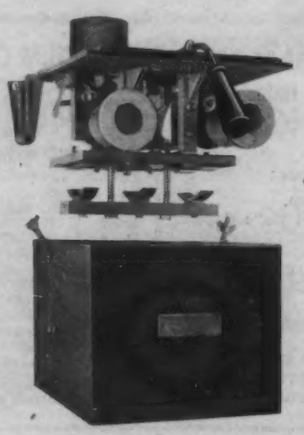
Federal Sign System (Electric)

618 Mission St., San Francisco

331 Oak Street, Portland, Ore.
1731 Telegraph Ave., Oakland, Calif.

Protect your small motors—

against under voltage, power interruption, and overload with



WELLS Motor Starting Switches

Quick Break
Positive Action
250 V. or less
5 H. P. or less

Absolutly prevents polyphase motors from operating single phase. An approved safety first switch recommended by the State Industrial Accident Commission. Equipped with standard inverse time limit plug. Your jobber carries them or order direct from

Wells-Morris Mfg. Co.
90 Second Street
San Francisco, California

Clearing House of Electrical Wants

WANTED—Experienced armature winders for both A.C. and D.C. work in a commercial shop. Inquire R. R. Poppleton, 71 Front St., Portland, Ore.

FOR SALE—Hydro-electric plant consisting of 750 kva. generator and three 400 h.p. vertical shaft turbines, designed for 20 foot head. Post Office Box 741, Grants Pass, Ore.

POSITION WANTED—By competent electrician, acquainted with materials and supplies, and experienced in the repairing, testing and maintenance of electrical apparatus. Desires a position in charge. Reference. Box 1002, Journal of Electricity.

POSITION WANTED—Electrical engineer and construction superintendent available in short time; American, age 34, technical graduate; ten years experience in design and construction of hydro-electric and steam generating and substations, testing, operation; special experience on switchboard layouts, specifications and purchasing of equipment; have handled various conditions of labor; at present completing engineering and construction of four large stations; considerable experience in transmission line calculations. Present salary $200 per month. Reply to Box 1001, Journal of Electricity.

BATTERIES MANUFACTURED BY THIS COMPANY ARE USED

By Large Central Lighting and Power Companies.

By Telephone and Telegraph Companies and for Wireless.

For Mine Locomotives, Battery Street Cars, Railway Signals, etc.

For Electric Vehicles and Industrial Trucks.

For Automobile Starting and Lighting.

"Exide" Batteries

Are doing big work — are making storage battery history in every field where there is need for storage battery power. And no matter where there is use for storage battery power we have a type of battery that is especially adapted to the particular requirement.

THE ELECTRIC STORAGE BATTERY CO.

The oldest and largest manufacturer of Storage Batteries in the country

1888 - PHILADELPHIA - 1918

New York Chicago Cleveland Rochester Minneapolis Washington Denver Boston St. Louis Atlanta Pittsburgh Kansas City Detroit San Francisco Toronto

Illustrating a 9 inch Oscillating Fan

Sell the 9 inch

Century

ALTERNATING CURRENT FANS

for residence service — the 3 point speed regulator provides a suitable volume of air for any condition.

They are quiet operating even on high speed.

Write for complete information on the 1918 line.

CENTURY ELECTRIC COMPANY

ST. LOUIS, U. S. A.

Western Sales Offices and Stocks at San Francisco, Portland, Los Angeles, Seattle, Spokane, Salt Lake City

Member Society for Electrical Development—Do it Electrically

295

NATIONAL MAZDA

TO BETTER LIGHT

Any of the labels below is a guarantee of National Quality.

"Bill, I made an investigation recently and found that 75% of all the electrical devices sold are not used because of the lack of proper electrical connections. Let's get this business with Wiremold."

"WIREMOLD offers a big field of sale for electrical extensions."

"Women buy electrical appliances to SAVE HOUSEWORK, then find them hard to connect because of high chandeliers and inconvenient wall sockets, and finally give up using them. *And things that aren't used quit selling.*"

"This new raceway—WIREMOLD—will take them off the shelves and put them back into use again. We'll get the work of installing the extensions with WIREMOLD, and there's enough profit to make a drive on this business worth while."

Only one building in fifty right in your neighborhood has enough electrical extensions to obtain full service from the current. WIREMOLD makes possible many new extensions in every building. Write for catalogue and our large Trade Folder describing the many advantages of WIREMOLD and the strong Selling Plan behind it. Sent free on request.

Large and fully assorted stocks are carried by

Pacific States Electric Co.
San Francisco and Branches

The American Conduit Mfg. Co.
New Kensington, Pa.

NEATLY CONCEALS ALL SURFACE WIRING

WIREMOLD

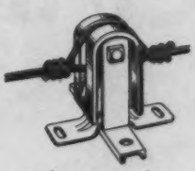
THE HARDWARE MAKES THE LINE

The Peirce WIREHOLDER

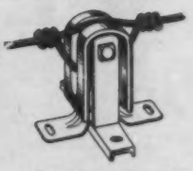
is the most satisfactory wall bracket ever made for secondary circuits up to 500 volts

Lowest Cost

For most work, no tie wires are required. The line is simply run through the hole in the insulator

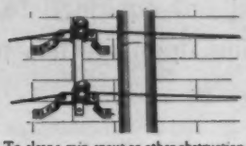


—or line wire may be run through hole in insulator and tie wire placed in outer groove.



—or line wire may be placed in outer groove and tie wire run through the hole—desirable when long runs are made.

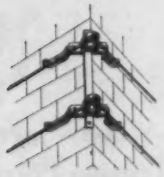
Least Labor



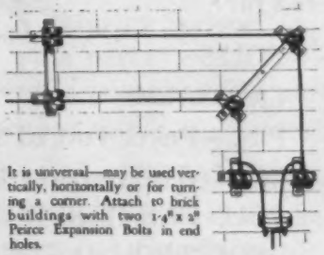
To clear a rain spout or other obstruction, mount Wireholders on No. 500 Bracket Foot and Corner Iron. Fasten Bracket Foot to brick buildings with two 1-4" x 2" Peirce Expansion Bolts.

With wires dead-ended at entrance, no tie wires are needed on intermediate fixtures. Attach Wireholder to wooden buildings with four R. H. Wood Screws in side slots.

Universal in Application



Can be used on corners with No. 500 Bracket Foot and Corner Iron. Attach Corner Iron to brick building with two 1-4" x 2" Peirce Expansion Bolts.



It is universal—may be used vertically, horizontally or for turning a corner. Attach to brick buildings with two 1-4" x 2" Peirce Expansion Bolts in end holes.

Practically Indestructible

Consists simply of two parts,—porcelain insulator and hot galvanized metal support. No bending strains, all metal in tension, all porcelain in compression, safe for 350 lb. pull in any direction on each insulator, wet test voltage of 1900 volts.

Manufactured by
HUBBARD & COMPANY
Pittsburgh, Pa.

Distributors for the Pacific Coast

Pacific States Electric Co.

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HUBBARD MAKES THE HARDWARE

ELECTRIC TRANSMISSION LINE SPECIALISTS

OVERHEAD UNDERGROUND

A department specially organized and equipped to furnish engineering and sales information upon electric pole line and underground materials.

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POLES
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INSULATORS--Locke High Tension Porcelain--Glass
POLE LINE HARDWARE--Hubbard
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BACKING

Thor

"The Machine That Stays Sold"

BACKING! There's the meaning of "Hurley Service" in *one word!* It is a part of every Hurley Dealer Agreement, an inseparable part of every Thor Washer sold.

And now that Hurley manufacturing facilities have again been expanded to accommodate present-day demands for Thor products, an even bigger, broader interpretation of Hurley "Backing" is possible. Thor dealers everywhere know what this means in *sales!*

A Size for Every Family. A Style for Every Purse.

Hurley Machine Company

28 E. Jackson Boulevard

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Distributors for the Pacific Coast

Pacific States Electric Co.

LOS ANGELES OAKLAND PORTLAND
SAN FRANCISCO SEATTLE

Sell Convenience to Your Customers

When a man buys a tool he doesn't buy simply the article — he buys the service he expects to get from its use.

Sell wiring devices the same way. When you install a switch, furnish the right kind to give the utmost of service and convenience in the case of each individual customer.

THE G-E THROUGH-CORD SWITCH furnishes the ideal method for breaking the circuit on heating devices and small household motors. Its metal exterior gives the added advantage of matching the appliances.

THE G-E PENDENT SWITCH is convenient for controlling lights in ceiling fixtures where wall switches were not provided in the original wiring. Furnished in finishes to match all fixtures.

THE G-E CEILING SWITCH AND THE G-E PULL SWITCH are good devices for similar use in offices, public buildings and factories.

A good merchandiser will sell the device best suited to the individual customer's need.

Distributors for the Pacific Coast

PACIFIC STATES ELECTRIC CO.

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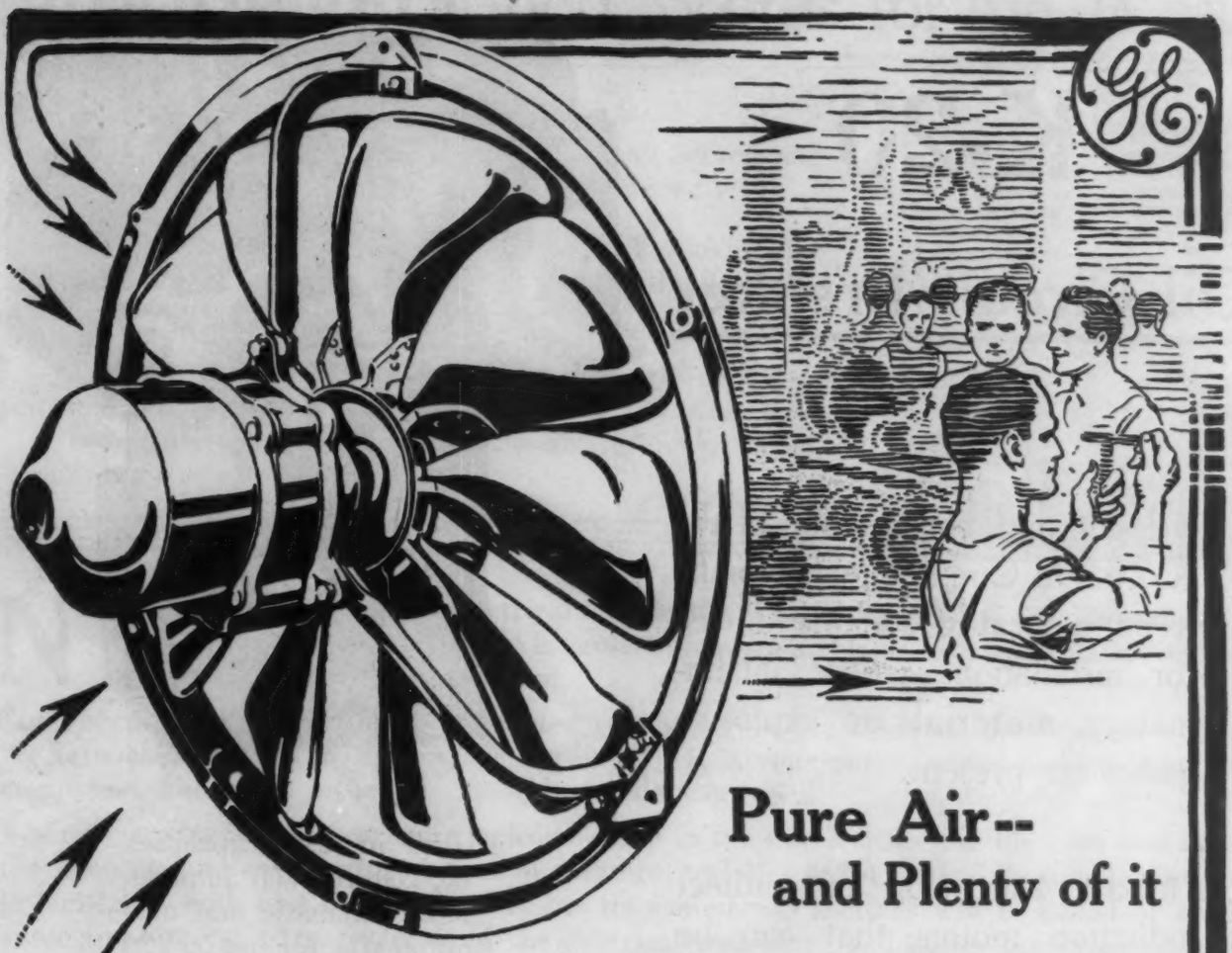

Pure Air--
and Plenty of it

The employee does better work and more of it when the air he breathes is being constantly removed and renewed. His comfort is increased and his rate of fatigue appreciably reduced.

G-E Exhaust Fans

are a good investment — Summer and Winter. Their cost of operation is slight compared to the returns in health and the "bracing up" of the workers. G-E Fans are well balanced and consequently run with little vibration and noise. Where varying amounts of air are required a simple control can be supplied which will vary the volume from 30% to maximum.

Order your fans before the sultry summer weather affects production.

Fans with diameters from 18" to 48" can be supplied for operation on direct or alternating current circuits.

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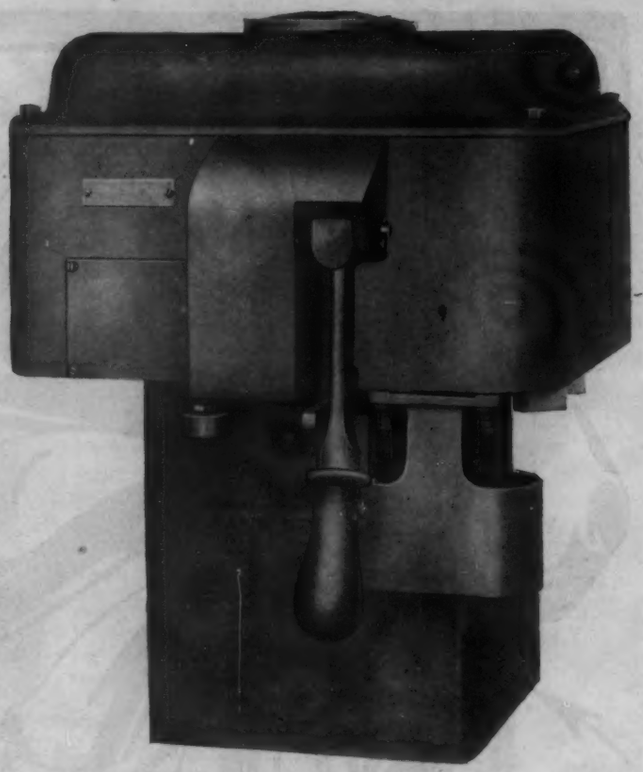
45-18

K-20

Oil Circuit Breaker



The design and construction of the K-20 Oil Circuit Breaker make it an especially suitable device for installations where inflammatory material or explosive gasses are present.

It is used to start, stop and protect induction motors that can be thrown directly on the line.

Its features allow a choice of attachments for a wide range of conditions. The few operating parts are strong and built to last.

Bulletin 47406

BUILT in three capacities, 60, 200 and 300 amperes, both automatic and non-automatic, for use on systems up to 2500 volts.

THE MOUNTING may be on a wall or post, or on a machine by the use of suitable supports.

A MAGNET LOCKING attachment can be furnished where it is desired to safeguard the operator while working on the machine.

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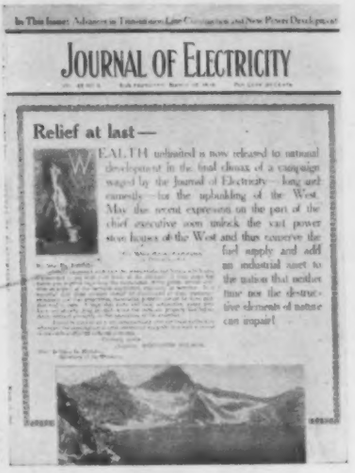
Fifty Billion Good Words for the West

THE JOURNAL OF ELECTRICITY has served the nation for nearly a third of a century (founded 1887).

A MILLION DOLLARS IN PUBLICITY looking toward the upbuilding of all that is good and wholesome in the West has gone forth in its pages.

AND IN THIS PUBLICITY it is conservatively estimated that fifty billion good words for the West have been disseminated throughout the entire known world.


JOURNAL OF ELECTRICITY

Relief at last—

NEARLY every progressive electrical man in the West is READING the Journal now, but we need your INDIVIDUAL subscriptions to enable us to maintain and further improve its present high standard.

The Journal is the one magazine devoted exclusively to the electrical development of the Western country, where "things are different." It is your paper, edited and managed by men whose success is intimately associated with your own.

Not only are its issues accorded a welcome place in the universities and libraries and upon the scientific and engineering shelves of technical societies of the nation, its columns quoted in legislative halls and in the congress, but its commercial sections will be found of equal value and interest. The problems of the electrical contractor and dealer are given especial attention. In the thirty-one years of its life, the Journal of Electricity has gone forth to practically every civilized country on the face of the earth.

The vast districts served intensively by the Journal of Electricity have, according to the U. S. Census report of 1912, but 6 per cent of the total population of the United States, with the following splendid characteristics—

Comprise nearly ¼ the total area of the United States.
Make up 1-7 of the total aggregate income of the electric lighting business.
Require nearly ¼ of the total generating capacity.
Have developed more than 1-3 of the total hydro-electric power.

	The West	The Rest of the U. S.
Annual per capita consumption	527 kw.-hr.	99 kw.-hr.
Total generating capacity of power companies	921,238 (by 6% of population)	4,125,000 (by 94% of population)
Power and light companies' income per capita	$7.50	$3.00

Installed h. p. capacity of motors for last ten years has increased over 1000%.

Cost of Central Station Construction and Equipment $593,000,000
(Exclusive of Combined Electric Railway and Power Companies)

Capital Stock,	Common,	$305,000,000
	Preferred,	68,000,000
	Funded Debt,	247,000,000
	Total,	$620,000,000

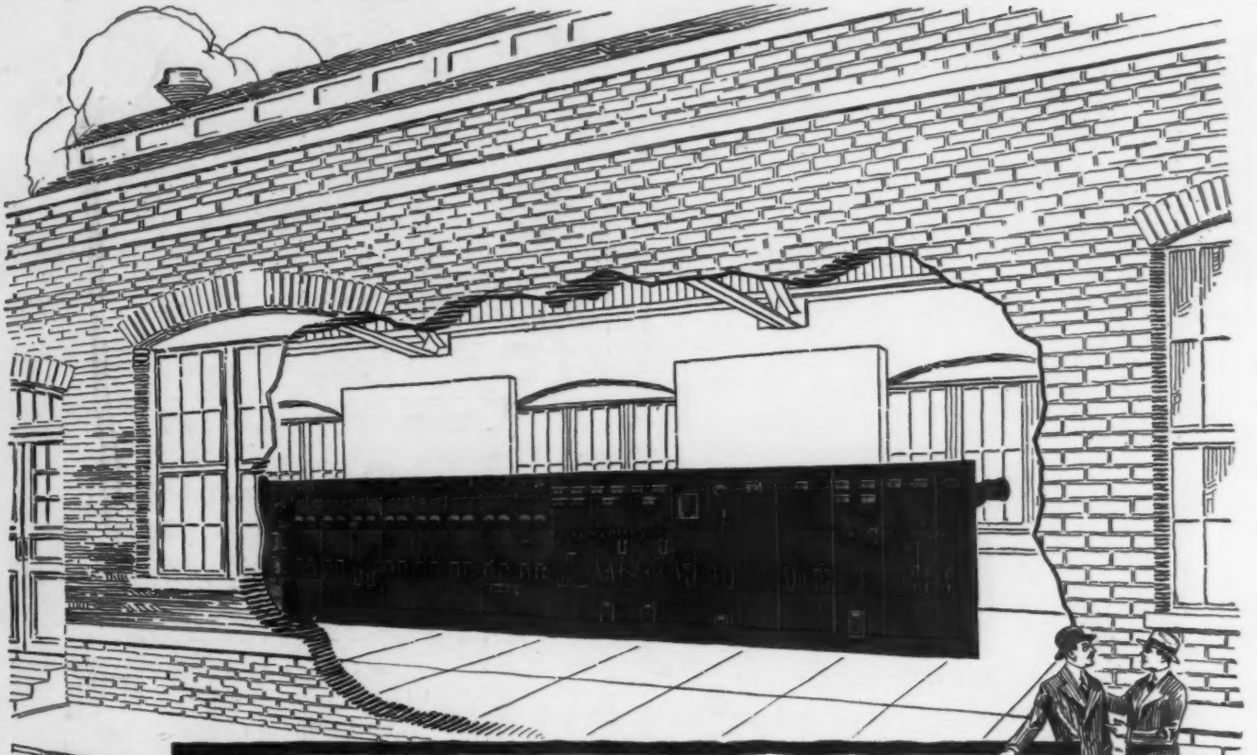
Will you help "boost the West" by sending in your subscription and urging others to subscribe?

Important Notice

The joint convention of Pacific Coast Section N. E. L. A., California Association Electrical Contractors and Dealers, and the National Electrical Supply Jobbers' Association of the Pacific Coast will be held at Del Monte, Calif., May 9, 10 and 11, 1918 and not April 24-27 as originally planned, because the latter date conflicts with the Liberty Loan Drive.

The Jobber's Association will hold their meeting on May 6, 7 and 8. The Contractors Association will convene May 8.

The advance papers for the Pacific Coast Section N.E.L.A. meeting have been authorized for publication in the Journal of Electricity of April 1st and April 15th. These issues should be taken to the convention as no further official publication will be made.



Seen in the Best of Stations

In days gone by nearly every new power station required switchboards designed especially for that station. Suitable devices and efficient operation could be obtained in no other way.

But this is no longer true. Every day more and more engineers are learning with surprise that

STANDARD UNIT PANELS

are perfectly suitable for most of the usual switchboard conditions. In combination with other panels their range of service is greatly extended.

The standard unit panel is never out of date. It is always being improved. Constant and comprehensive study of all new switchboard requirements makes this possible.

Never less—often more—than 10% in price and 25% in delivery saved on every panel purchased in the Standard Unit Way.

Write now for index Bulletin 47001.

General Electric Company

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7201

PIPING in Power Plants of today must be dependable. We are Piping Manufacturers and Contractors and specialize in Blast Furnace, Steel Plant and Coke Oven Work.

We make Pipe Bends of all kinds and sizes
Cast Steel Valves and Fittings, Etc.

Let us know your requirements.

Pittsburg Piping and Equipment Co.
THEO F. DREDGE, Pacific Coast Representative
Monadnock Bldg., San Francisco 3

OKONITE WIRE

OKONITE
TRADE MARK.
REG. U.S. PAT. OFFICE

The STANDARD for RUBBER INSULATION

Okonite Tape, Manson Tape
Candee Weatherproof Wire,
Candee [Patented] Potheads.

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CENTRAL ELECTRIC CO. Chicago, Ill.
General Western Agents
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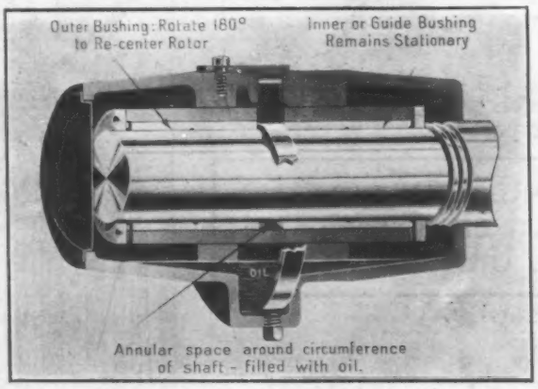
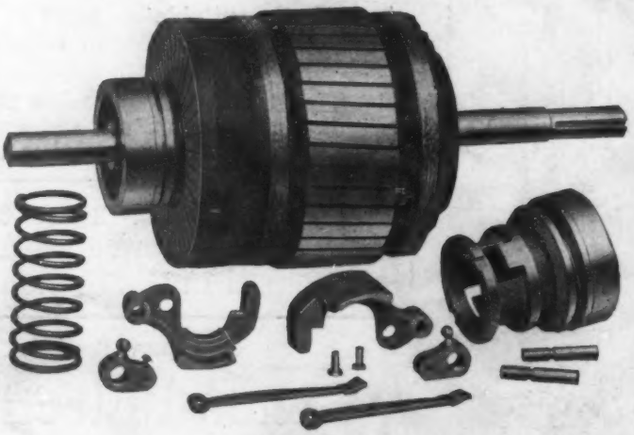
HOWELL
POLYPHASE MOTORS


Outer Bushing: Rotate 180° to Re-center Rotor
Inner or Guide Bushing Remains Stationary
OIL
Annular space around circumference of shaft - filled with oil.

Bearing Detail
Bronze Bushings 100% Oversize
Well Protected from Dust

Howell Electric Motors Co.
Howell, Michigan

PEERLESS
SINGLE PHASE MOTORS



Rotor Detail
Rugged Construction
Minimum Number of Parts

The Peerless Electric Co.
Warren, Ohio

Garland-Affolter Engineering Co.
Western Distributors
SEATTLE **SAN FRANCISCO** **LOS ANGELES**